

CPC COOPERATIVE PATENT CLASSIFICATION

H ELECTRICITY

(NOTE omitted)

H01 BASIC ELECTRIC ELEMENTS

(NOTES omitted)

H01L SEMICONDUCTOR DEVICES; ELECTRIC SOLID STATE DEVICES NOT OTHERWISE PROVIDED FOR (use of semiconductor devices for measuring [G01](#); resistors in general [H01C](#); magnets, inductors, transformers [H01F](#); capacitors in general [H01G](#); electrolytic devices [H01G 9/00](#); batteries, accumulators [H01M](#); waveguides, resonators, or lines of the waveguide type [H01P](#); line connectors, current collectors [H01R](#); stimulated-emission devices [H01S](#); electromechanical resonators [H03H](#); loudspeakers, microphones, gramophone pick-ups or like acoustic electromechanical transducers [H04R](#); electric light sources in general [H05B](#); printed circuits, hybrid circuits, casings or constructional details of electrical apparatus, manufacture of assemblages of electrical components [H05K](#); use of semiconductor devices in circuits having a particular application, see the subclass for the application)

NOTES

1. This subclass covers:
 - electric solid state devices which are not covered by any other subclass and details thereof, and includes: semiconductor devices adapted for rectifying, amplifying, oscillating or switching; semiconductor devices sensitive to radiation; electric solid state devices using thermoelectric, superconductive, piezo-electric, electrostrictive, magnetostrictive, galvano-magnetic or bulk negative resistance effects and integrated circuit devices;
 - photoresistors, magnetic field dependent resistors, field effect resistors, capacitors with potential-jump barrier, resistors with potential-jump barrier or surface barrier, incoherent light emitting diodes and thin-film or thick-film circuits;
 - processes and apparatus adapted for the manufacture or treatment of such devices, except where such processes relate to single-step processes for which provision exists elsewhere.
2. In this subclass, the following terms or expressions are used with the meaning indicated:
 - "wafer" means a slice of semiconductor or crystalline substrate material, which can be modified by impurity diffusion (doping), ion implantation or epitaxy, and whose active surface can be processed into arrays of discrete components or integrated circuits;
 - "solid state body" means the body of material within which, or at the surface of which, the physical effects characteristic of the device occur. In thermoelectric devices, it includes all materials in the current path.
Regions in or on the body of the device (other than the solid state body itself), which exert an influence on the solid state body electrically, are considered to be "electrodes" whether or not an external electrical connection is made thereto. An electrode may include several portions and the term includes metallic regions which exert influence on the solid state body through an insulating region (e.g. capacitive coupling) and inductive coupling arrangements to the body. The dielectric region in a capacitive arrangement is regarded as part of the electrode. In arrangements including several portions, only those portions which exert an influence on the solid state body by virtue of their shape, size, or disposition or the material of which they are formed are considered to be part of the electrode. The other portions are considered to be "arrangements for conducting electric current to or from the solid state body" or "interconnections between solid state components formed in or on a common substrate", i.e. leads;
 - "device" means an electric circuit element; where an electric circuit element is one of a plurality of elements formed in or on a common substrate it is referred to as a "component";
 - "complete device" is a device in its fully assembled state which may or may not require further treatment, e.g. electroforming, before it is ready for use but which does not require the addition of further structural units;
 - "parts" includes all structural units which are included in a complete device;
 - "container" is an enclosure forming part of the complete device and is essentially a solid construction in which the body of the device is placed, or which is formed around the body without forming an intimate layer thereon. An enclosure which consists of one or more layers formed on the body and in intimate contact therewith is referred to as an "encapsulation";
 - "integrated circuit" is a device where all components, e.g. diodes, resistors, are built up on a common substrate and form the device including interconnections between the components;
 - "assembly" of a device is the building up of the device from its component constructional units and includes the provision of fillings in containers.
3. In this subclass, both the process or apparatus for the manufacture or treatment of a device and the device itself are classified, whenever both of these are described sufficiently to be of interest.

H01L

H01L

(continued)

4. Attention is drawn to Note (3) after the title of section [C](#), which Note indicates to which version of the periodic table of chemical elements the IPC refers. In this subclass, the Periodic System used is the 8 group system indicated by Roman numerals in the Periodic Table thereunder.

WARNINGS

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

H01L 21/301	covered by	H01L 21/30
H01L 21/328	covered by	H01L 29/66075
H01L 21/329	covered by	H01L 29/66083
H01L 21/33	covered by	H01L 29/66227
H01L 21/331	covered by	H01L 29/66234
H01L 21/332	covered by	H01L 29/66363
H01L 21/334	covered by	H01L 29/66075
H01L 21/335	covered by	H01L 29/66409
H01L 21/336	covered by	H01L 29/66477
H01L 21/337	covered by	H01L 29/66893
H01L 21/338	covered by	H01L 29/66848
H01L 21/339	covered by	H01L 29/66946
H01L 21/36-H01L 21/368	covered by	H01L 21/02107
H01L 21/58	covered by	H01L 24/80
H01L 21/66	covered by	H01L 22/00
H01L 21/8242	covered by	H01L 27/108
H01L 21/8244	covered by	H01L 27/11
H01L 21/8246	covered by	H01L 27/112
H01L 21/98	covered by	H01L 25/50
H01L 29/38	covered by	H01L 29/04-H01L 29/365
H01L 29/96	covered by	H01L 29/68-H01L 29/945
H01L 51/30	covered by	H01L 51/0032
H01L 51/40	covered by	H01L 51/0001
H01L 51/46	covered by	H01L 51/0032
H01L 51/48	covered by	H01L 51/0001
H01L 51/54	covered by	H01L 51/0032

2. {In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.}

21/00 Processes or apparatus adapted for the manufacture or treatment of semiconductor or solid state devices or of parts thereof

21/02 . Manufacture or treatment of semiconductor devices or of parts thereof

21/02002 . . {Preparing wafers}

NOTES

1. This group covers processes for manufacturing wafers prior to the fabrication of any device, i.e. between the sawing of ingots (covered by [B28D](#)) and the cleaning of substrates (covered by [H01L 21/02041](#)).
2. This group does not cover:
 - simple use of grinding or polishing machines [B24B](#)
 - thermal smoothening [H01L 21/324](#)

21/02005 . . . {Preparing bulk and homogeneous wafers}

21/02008 {Multistep processes}

21/0201 {Specific process step}

21/02013 {Grinding, lapping}

21/02016 {Backside treatment}

21/02019 {Chemical etching}

21/02021 {Edge treatment, chamfering}

21/02024 {Mirror polishing}

21/02027 {Setting crystal orientation}

21/0203 {Making porous regions on the surface}

21/02032 {by reclaiming or re-processing}

21/02035 {Shaping}

21/02041 . . {Cleaning}

21/02043 . . . {Cleaning before device manufacture, i.e. Begin-Of-Line process}

21/02046 {Dry cleaning only ([H01L 21/02085](#) takes precedence)}

21/02049 {with gaseous HF}

21/02052 {Wet cleaning only ([H01L 21/02085](#) takes precedence)}

21/02054 {combining dry and wet cleaning steps ([H01L 21/02085](#) takes precedence)}

21/02057 . . . {Cleaning during device manufacture}

21/0206 {during, before or after processing of insulating layers}

21/02063 {the processing being the formation of vias or contact holes}

21/02065 {the processing being a planarization of insulating layers}

21/02068 {during, before or after processing of conductive layers, e.g. polysilicon or amorphous silicon layers}

21/02071 {the processing being a delineation, e.g. RIE, of conductive layers}

21/02074 {the processing being a planarization of conductive layers}

21/02076 . . . {Cleaning after the substrates have been singulated}

- 21/02079 . . . {Cleaning for reclaiming}
 21/02082 . . . {product to be cleaned}
 21/02085 . . . {Cleaning of diamond}
 21/02087 . . . {Cleaning of wafer edges}
 21/0209 . . . {Cleaning of wafer backside}
 21/02093 . . . {Cleaning of porous materials}
 21/02096 . . . {only mechanical cleaning}
 21/02098 . . . {only involving lasers, e.g. laser ablation}
 21/02101 . . . {only involving supercritical fluids}
 21/02104 . . {Forming layers (deposition in general [C23C](#); crystal growth in general [C30B](#))}

WARNING

Groups [H01L 21/02104](#) – [H01L 21/02694](#) are incomplete pending reclassification of documents from groups [H01L 21/06](#), [H01L 21/16](#), and [H01L 21/20](#).

Groups [H01L 21/02104](#) – [H01L 21/02694](#), [H01L 21/06](#), [H01L 21/20](#), and [H01L 21/16](#) should be considered in order to perform a complete search.

- 21/02107 . . . {Forming insulating materials on a substrate}

WARNING

Groups [H01L 21/02107](#) – [H01L 21/02326](#) are incomplete pending reclassification of documents from groups [H01L 21/312](#), [H01L 21/314](#), [H01L 21/316](#), and [H01L 21/318](#).

Groups [H01L 21/02107](#) – [H01L 21/02326](#), [H01L 21/312](#), [H01L 21/314](#), [H01L 21/316](#), and [H01L 21/318](#) should be considered in order to perform a complete search.

- 21/02109 . . . {characterised by the type of layer, e.g. type of material, porous/non-porous, pre-cursors, mixtures or laminates}
 21/02112 . . . {characterised by the material of the layer}

NOTE

Layers comprising sublayers, i.e. multi-layers, are additionally classified in [H01L 21/022](#); porous layers are additionally classified in [H01L 21/02203](#)

- 21/02115 . . . {the material being carbon, e.g. alpha-C, diamond or hydrogen doped carbon}
 21/02118 . . . {carbon based polymeric organic or inorganic material, e.g. polyimides, poly cyclobutene or PVC (polymers per se [C08G](#), photoresist per se [G03F](#))}
 21/0212 . . . {the material being fluoro carbon compounds, e.g. (CF_x)_n, (CH_xF_y)_n or polytetrafluoroethylene}
 21/02123 . . . {the material containing silicon}
 21/02126 . . . {the material containing Si, O, and at least one of H, N, C, F, or other non-metal elements, e.g. SiOC, SiOC:H or SiONC}

- 21/02129 . . . {the material being boron or phosphorus doped silicon oxides, e.g. BPSG, BSG or PSG}

NOTE

Halogen, e.g. fluorine, containing BPSG, PSG, BSG, and the like, are additionally classified in [H01L 21/02131](#)

- 21/02131 . . . {the material being halogen doped silicon oxides, e.g. FSG}
 21/02134 . . . {the material comprising hydrogen silsesquioxane, e.g. HSQ}
 21/02137 . . . {the material comprising alkyl silsesquioxane, e.g. MSQ}
 21/0214 . . . {the material being a silicon oxynitride, e.g. SiON or SiON:H}
 21/02142 . . . {the material containing silicon and at least one metal element, e.g. metal silicate based insulators or metal silicon oxynitrides}
 21/02145 . . . {the material containing aluminium, e.g. AlSiO_x}
 21/02148 . . . {the material containing hafnium, e.g. HfSiO_x or HfSiON}
 21/0215 . . . {the material containing tantalum, e.g. TaSiO_x}
 21/02153 . . . {the material containing titanium, e.g. TiSiO_x}
 21/02156 . . . {the material containing at least one rare earth element, e.g. silicate of lanthanides, scandium or yttrium}
 21/02159 . . . {the material containing zirconium, e.g. ZrSiO_x}
 21/02161 . . . {the material containing more than one metal element}
 21/02164 . . . {the material being a silicon oxide, e.g. SiO₂}

NOTE

The formation of silicon oxide layers is classified in this group regardless of the precursor or of the process of formation; in case of explicit statements on doping, on rest-groups, or on material components see [H01L 21/02126](#) and subgroups; deposition of silicon oxide from organic precursors without further statements on film composition is classified here and in [H01L 21/02205](#) and subgroups

- 21/02167 . . . {the material being a silicon carbide not containing oxygen, e.g. SiC, SiC:H or silicon carbonitrides ([H01L 21/02126](#) and [H01L 21/0214](#) take precedence)}
 21/0217 . . . {the material being a silicon nitride not containing oxygen, e.g. Si₃N₄ or Si₃ByN_z ([H01L 21/02126](#) and [H01L 21/0214](#) take precedence)}

- 21/02172 {the material containing at least one metal element, e.g. metal oxides, metal nitrides, metal oxynitrides or metal carbides (materials containing silicon [H01L 21/02123](#); metal silicates [H01L 21/02142](#))}
- 21/02175 {characterised by the metal ([H01L 21/02197](#) takes precedence)}
- 21/02178 {the material containing aluminium, e.g. Al_2O_3 }
- 21/02181 {the material containing hafnium, e.g. HfO_2 }
- 21/02183 {the material containing tantalum, e.g. Ta_2O_5 }
- 21/02186 {the material containing titanium, e.g. TiO_2 }
- 21/02189 {the material containing zirconium, e.g. ZrO_2 }
- 21/02192 {the material containing at least one rare earth metal element, e.g. oxides of lanthanides, scandium or yttrium}
- 21/02194 {the material containing more than one metal element}
- 21/02197 {the material having a perovskite structure, e.g. BaTiO_3 }
- 21/022 {the layer being a laminate, i.e. composed of sublayers, e.g. stacks of alternating high-k metal oxides (adhesion layers or buffer layers [H01L 21/02304](#), [H01L 21/02362](#))}
- 21/02203 {the layer being porous}
- 21/02205 {the layer being characterised by the precursor material for deposition}
- 21/02208 {the precursor containing a compound comprising Si}
- 21/02211 {the compound being a silane, e.g. disilane, methylsilane or chlorosilane}
- 21/02214 {the compound comprising silicon and oxygen}

NOTE

This group does not cover mixtures of a silane and oxygen

- 21/02216 {the compound being a molecule comprising at least one silicon-oxygen bond and the compound having hydrogen or an organic group attached to the silicon or oxygen, e.g. a siloxane}
- 21/02219 {the compound comprising silicon and nitrogen}

NOTE

This group does not cover mixtures of silane and nitrogen

- 21/02222 {the compound being a silazane}
- 21/02225 {characterised by the process for the formation of the insulating layer}

- 21/02227 {formation by a process other than a deposition process}

NOTE

Subject matter classified in the range of [H01L 21/0223](#) - [H01L 21/02249](#) is additionally classified in [H01L 21/02249](#), [H01L 21/02255](#) and [H01L 21/02252](#), depending on the type of reaction

- 21/0223 {formation by oxidation, e.g. oxidation of the substrate}
- 21/02233 {of the semiconductor substrate or a semiconductor layer}
- 21/02236 {group IV semiconductor}
- 21/02238 {silicon in uncombined form, i.e. pure silicon}
- 21/02241 {III-V semiconductor}
- 21/02244 {of a metallic layer}
- 21/02247 {formation by nitridation, e.g. nitridation of the substrate}
- 21/02249 {formation by combined oxidation and nitridation performed simultaneously}
- 21/02252 {formation by plasma treatment, e.g. plasma oxidation of the substrate (after treatment of an insulating film by plasma [H01L 21/3105](#) and subgroups)}
- 21/02255 {formation by thermal treatment ([H01L 21/02252](#) takes precedence; after treatment of an insulating film [H01L 21/3105](#) and subgroups)}
- 21/02258 {formation by anodic treatment, e.g. anodic oxidation}
- 21/0226 {formation by a deposition process ([per se C23C](#))}
- 21/02263 {deposition from the gas or vapour phase}

NOTE

This group and subgroups also cover deposition methods in which the gas or vapour is produced by physical means, e.g. ablation from targets or heating of source material

- 21/02266 {deposition by physical ablation of a target, e.g. sputtering, reactive sputtering, physical vapour deposition or pulsed laser deposition}
- 21/02269 {deposition by thermal evaporation ([H01L 21/02293](#) takes precedence)}

NOTE

Subject matter relating to molecular beam epitaxy is classified in this group

- 21/02271 {deposition by decomposition or reaction of gaseous or vapour phase compounds, i.e. chemical vapour deposition ([H01L 21/02266](#) takes precedence)}
- 21/02274 {in the presence of a plasma [PECVD]}

- 21/02277 {the reactions being activated by other means than plasma or thermal, e.g. photo-CVD}
- 21/0228 {deposition by cyclic CVD, e.g. ALD, ALE, pulsed CVD}

NOTE

Subject matter relating to cyclic plasma CVD is additionally classified in [H01L 21/02274](#)

- 21/02282 {liquid deposition, e.g. spin-coating, sol-gel techniques, spray coating}
- 21/02285 {Langmuir-Blodgett techniques}
- 21/02288 {printing, e.g. ink-jet printing ([per se B41J](#))}
- 21/0229 {liquid atomic layer deposition}
- 21/02293 {formation of epitaxial layers by a deposition process ([epitaxial growth per se C30B](#))}

NOTE

Formation of non-epitaxial layers by MBE, ALE, etc. is not covered by this group; for MBE [see H01L 21/02269](#); for ALE [see H01L 21/0228](#)

- 21/02296 {characterised by the treatment performed before or after the formation of the layer ([H01L 21/02227](#) and subgroups take precedence)}

NOTE

This group and subgroups only cover processes which are directly linked to the layer formation; routine anneals, i.e. thermal treatment without further features like a special atmosphere, presence of a plasma, thermally induced chemical reactions, change of phase (crystal structure) etc. are not classified here; for cleaning [see H01L 21/02041](#) and subgroups; for etching processes [see H01L 21/311](#) and subgroups; for planarization processes [see H01L 21/31051](#) and subgroups; for processes to repair etch damage [see H01L 21/3105](#) and subgroups

- 21/02299 {pre-treatment}

NOTE

This group and subgroups cover treatments to improve adhesion or change the surface termination; for etching [see H01L 21/306](#) and subgroups and [H01L 21/311](#) and subgroups

- 21/02301 {in-situ cleaning}

NOTE

Subject matter relating to the cleaning processes for semiconductor devices in general is covered by [H01L 21/02041](#) and subgroups

- 21/02304 {formation of intermediate layers, e.g. buffer layers, layers to improve adhesion, lattice match or diffusion barriers}
- 21/02307 {treatment by exposure to a liquid}
- 21/0231 {treatment by exposure to electromagnetic radiation, e.g. UV light}
- 21/02312 {treatment by exposure to a gas or vapour}
- 21/02315 {treatment by exposure to a plasma}
- 21/02318 {post-treatment}

NOTE

This group only covers processes that are part of the layer formation; treatments which are performed after completion of the insulating layer are covered by [H01L 21/3105](#) and subgroups

- 21/02321 {introduction of substances into an already existing insulating layer ([H01L 21/02227](#) and subgroups take precedence)}

NOTE

processes like the introduction of phosphorus into silicon oxide by diffusion, or doping of an already existing insulating layer are covered by this group and subgroups; for the method of introduction, [see H01L 21/02337](#), [H01L 21/02343](#), [H01L 21/02345](#) and subgroups

- 21/02323 {introduction of oxygen}
- 21/02326 {into a nitride layer, e.g. changing SiN to SiON}
- 21/02329 {introduction of nitrogen}
- 21/02332 {into an oxide layer, e.g. changing SiO to SiON}
- 21/02334 {in-situ cleaning after layer formation, e.g. removing process residues}

NOTE

Subject matter relating to the cleaning processes for semiconductor devices in general is covered by [H01L 21/02041](#) and subgroups

- 21/02337 {treatment by exposure to a gas or vapour}
- 21/0234 {treatment by exposure to a plasma}
- 21/02343 {treatment by exposure to a liquid}
- 21/02345 {treatment by exposure to radiation, e.g. visible light}
- 21/02348 {treatment by exposure to UV light}
- 21/02351 {treatment by exposure to corpuscular radiation, e.g. exposure to electrons, alpha-particles, protons or ions}
- 21/02354 {using a coherent radiation, e.g. a laser}

- 21/02356 {treatment to change the morphology of the insulating layer, e.g. transformation of an amorphous layer into a crystalline layer}
- 21/02359 {treatment to change the surface groups of the insulating layer}
- 21/02362 {formation of intermediate layers, e.g. capping layers or diffusion barriers}
- 21/02365 . . . {Forming inorganic semiconducting materials on a substrate (for light-sensitive devices [H01L 31/00](#))}

WARNING

Group [H01L 21/02365](#) is incomplete pending reclassification of documents from groups [H01L 21/06](#), [H01L 21/16](#), and [H01L 21/20](#)

Groups [H01L 21/06](#), [H01L 21/16](#), and [H01L 21/20](#) should be considered in order to perform a complete search.

- 21/02367 {Substrates}
- 21/0237 {Materials}
- 21/02373 {Group 14 semiconducting materials}
- 21/02376 {Carbon, e.g. diamond-like carbon}
- 21/02378 {Silicon carbide}
- 21/02381 {Silicon, silicon germanium, germanium}
- 21/02384 {including tin}
- 21/02387 {Group 13/15 materials}
- 21/02389 {Nitrides}
- 21/02392 {Phosphides}
- 21/02395 {Arsenides}
- 21/02398 {Antimonides}
- 21/024 {Group 12/16 materials}
- 21/02403 {Oxides}
- 21/02406 {Sulfides}
- 21/02409 {Selenides}
- 21/02411 {Tellurides}
- 21/02414 {Oxide semiconducting materials not being Group 12/16 materials, e.g. ternary compounds}
- 21/02417 {Chalcogenide semiconducting materials not being oxides, e.g. ternary compounds}
- 21/0242 {Crystalline insulating materials}
- 21/02422 {Non-crystalline insulating materials, e.g. glass, polymers}
- 21/02425 {Conductive materials, e.g. metallic silicides}
- 21/02428 {Structure}
- 21/0243 {Surface structure}
- 21/02433 {Crystal orientation}
- 21/02436 {Intermediate layers between substrates and deposited layers}
- 21/02439 {Materials}
- 21/02441 {Group 14 semiconducting materials}
- 21/02444 {Carbon, e.g. diamond-like carbon}
- 21/02447 {Silicon carbide}
- 21/0245 {Silicon, silicon germanium, germanium}
- 21/02452 {including tin}
- 21/02455 {Group 13/15 materials}
- 21/02458 {Nitrides}

- 21/02461 {Phosphides}
- 21/02463 {Arsenides}
- 21/02466 {Antimonides}
- 21/02469 {Group 12/16 materials}
- 21/02472 {Oxides}
- 21/02474 {Sulfides}
- 21/02477 {Selenides}
- 21/0248 {Tellurides}
- 21/02483 {Oxide semiconducting materials not being Group 12/16 materials, e.g. ternary compounds}
- 21/02485 {Other chalcogenide semiconducting materials not being oxides, e.g. ternary compounds}
- 21/02488 {Insulating materials}
- 21/02491 {Conductive materials}
- 21/02494 {Structure}
- 21/02496 {Layer structure}
- 21/02499 {Monolayers}
- 21/02502 {consisting of two layers}
- 21/02505 {consisting of more than two layers}
- 21/02507 {Alternating layers, e.g. superlattice}
- 21/0251 {Graded layers}
- 21/02513 {Microstructure}
- 21/02516 {Crystal orientation}
- 21/02518 {Deposited layers}
- 21/02521 {Materials}
- 21/02524 {Group 14 semiconducting materials}
- 21/02527 {Carbon, e.g. diamond-like carbon}
- 21/02529 {Silicon carbide}
- 21/02532 {Silicon, silicon germanium, germanium}
- 21/02535 {including tin}
- 21/02538 {Group 13/15 materials}
- 21/0254 {Nitrides}
- 21/02543 {Phosphides}
- 21/02546 {Arsenides}
- 21/02549 {Antimonides}
- 21/02551 {Group 12/16 materials}
- 21/02554 {Oxides}
- 21/02557 {Sulfides}
- 21/0256 {Selenides}
- 21/02562 {Tellurides}
- 21/02565 {Oxide semiconducting materials not being Group 12/16 materials, e.g. ternary compounds}
- 21/02568 {Chalcogenide semiconducting materials not being oxides, e.g. ternary compounds}
- 21/0257 {Doping during depositing}
- 21/02573 {Conductivity type}
- 21/02576 {N-type}
- 21/02579 {P-type}
- 21/02581 {Transition metal or rare earth elements}
- 21/02584 {Delta-doping}
- 21/02587 {Structure}
- 21/0259 {Microstructure}
- 21/02592 {amorphous}
- 21/02595 {polycrystalline}
- 21/02598 {monocrystalline}

21/02601	. . . . . {Nanoparticles (fullerenes H01L 51/0046)}	21/0271	. . . . {comprising organic layers}
21/02603	. . . . . {Nanowires}	21/0272	. . . . {for lift-off processes}
21/02606	. . . . . {Nanotubes (carbon nanotubes H01L 51/0048)}	21/0273	. . . . {characterised by the treatment of photoresist layers}
21/02609	. . . . . {Crystal orientation}	21/0274	. . . . . {Photolithographic processes}
21/02612	. . . . . {Formation types}	21/0275	. . . . . {using lasers}
21/02614	. . . . . {Transformation of metal, e.g. oxidation, nitridation}	21/0276	. . . . . {using an anti-reflective coating (anti-reflective coating for lithography in general G03F 7/09)}
21/02617	. . . . . {Deposition types}	21/0277	. . . . . {Electrolithographic processes}
21/0262	. . . . . {Reduction or decomposition of gaseous compounds, e.g. CVD}	21/0278	. . . . . {Röntgenlithographic or X-ray lithographic processes}
21/02623	. . . . . {Liquid deposition}	21/0279	. . . . . {Ionlithographic processes}
21/02625	. . . . . {using melted materials}	21/033	. . . . comprising inorganic layers
21/02628	. . . . . {using solutions}	21/0331	. . . . {for lift-off processes}
21/02631	. . . . . {Physical deposition at reduced pressure, e.g. MBE, sputtering, evaporation}	21/0332	. . . . {characterised by their composition, e.g. multilayer masks, materials}
21/02634	. . . . . {Homoepitaxy}	21/0334	. . . . {characterised by their size, orientation, disposition, behaviour, shape, in horizontal or vertical plane}
21/02636	. . . . . {Selective deposition, e.g. simultaneous growth of mono- and non-monocrystalline semiconductor materials}	21/0335	. . . . . {characterised by their behaviour during the process, e.g. soluble masks, redeposited masks}
21/02639	. . . . . {Preparation of substrate for selective deposition}	21/0337	. . . . . {characterised by the process involved to create the mask, e.g. lift-off masks, sidewalls, or to modify the mask, e.g. pre-treatment, post-treatment}
21/02642	. . . . . {Mask materials other than SiO ₂ or SiN}	21/0338	. . . . . {Process specially adapted to improve the resolution of the mask}
21/02645	. . . . . {Seed materials}	21/04	. . the devices having at least one potential-jump barrier or surface barrier, e.g. PN junction, depletion layer or carrier concentration layer {(multistep manufacturing processes for semiconductor bodies of said devices H01L 29/02 ; multistep manufacturing processes for electrodes of said devices H01L 29/401 ; multistep manufacturing processes for said devices H01L 29/66007)}
21/02647	. . . . . {Lateral overgrowth}	21/0405	. . . {the devices having semiconductor bodies comprising semiconducting carbon, e.g. diamond, diamond-like carbon (multistep processes for the manufacture of said devices H01L 29/66015)}
21/0265	. . . . . {Pendeoepitaxy}	NOTE	
21/02653	. . . . . {Vapour-liquid-solid growth}	This group <u>covers</u> passivation	
21/02656	. . . . . {Special treatments}	21/041	. . . . {Making n- or p-doped regions}
21/02658	. . . . . {Pretreatments (cleaning in general H01L 21/02041)}	21/0415	. . . . . {using ion implantation}
21/02661	. . . . . {In-situ cleaning}	21/042	. . . . {Changing their shape, e.g. forming recesses (etching of the semiconductor body H01L 21/302)}
21/02664	. . . . . {Aftertreatments (planarisation in general H01L 21/304)}	21/0425	. . . . {Making electrodes}
21/02667	. . . . . {Crystallisation or recrystallisation of non-monocrystalline semiconductor materials, e.g. regrowth}	21/043	. . . . . {Ohmic electrodes}
21/02669	. . . . . {using crystallisation inhibiting elements}	21/0435	. . . . . {Schottky electrodes}
21/02672	. . . . . {using crystallisation enhancing elements}	21/044	. . . . . {Conductor-insulator-semiconductor electrodes}
21/02675	. . . . . {using laser beams}	21/0445	. . . {the devices having semiconductor bodies comprising crystalline silicon carbide (multistep processes for the manufacture of said devices H01L 29/66053)}
21/02678	. . . . . {Beam shaping, e.g. using a mask}	21/045	. . . . {passivating silicon carbide surfaces}
21/0268	. . . . . {Shape of mask}	21/0455	. . . . {Making n or p doped regions or layers, e.g. using diffusion}
21/02683	. . . . . {Continuous wave laser beam}		
21/02686	. . . . . {Pulsed laser beam}		
21/02689	. . . . . {using particle beams}		
21/02691	. . . . . {Scanning of a beam}		
21/02694	. . . . . {Controlling the interface between substrate and epitaxial layer, e.g. by ion implantation followed by annealing}		
21/02697	. . . {Forming conducting materials on a substrate}		
21/027	. . Making masks on semiconductor bodies for further photolithographic processing not provided for in group H01L 21/18 or H01L 21/34 {(photographic masks or originals per se G03F 1/00 ; registration or positioning of photographic masks or originals G03F 9/00 ; photographic cameras G03B ; control of position G05D 3/00)}		

21/046	. . . . . {using ion implantation}	21/18	. . . the devices having semiconductor bodies comprising elements of Group IV of the Periodic System or A _{III} B _V compounds with or without impurities, e.g. doping materials { (H01L 21/041 - H01L 21/0425, H01L 21/045 - H01L 21/048 take precedence) }
	NOTE		NOTE
	Processes where ion implantation of boron and subsequent annealing does not produce a p-doped region are classified elsewhere, e.g. H01L 21/0445		This group covers also processes and apparatus which, by using the appropriate technology, are clearly suitable for manufacture or treatment of devices whose bodies comprise elements of Group IV of the Periodic System or A _{III} B _V compounds, even if the material used is not explicitly specified.
21/0465	. . . . . {using masks}	21/182	. . . . . {Intermixing or interdiffusion or disordering of III-V heterostructures, e.g. IILD}
21/047	. . . . . {characterised by the angle between the ion beam and the crystal planes or the main crystal surface}	21/185	. . . . . {Joining of semiconductor bodies for junction formation}
21/0475	. . . . . {Changing the shape of the semiconductor body, e.g. forming recesses, (etching of the semiconductor body H01L 21/302) }	21/187	. . . . . {by direct bonding}
21/048	. . . . . {Making electrodes}	21/20	. . . . . Deposition of semiconductor materials on a substrate, e.g. epitaxial growth {solid phase epitaxy}
21/0485	. . . . . {Ohmic electrodes}		WARNING
21/049	. . . . . {Conductor-insulator-semiconductor electrodes, e.g. MIS contacts}		Group H01L 21/20 is impacted by reclassification into groups H01L 21/02365 – H01L 21/02694 .
21/0495	. . . . . {Schottky electrodes}		Groups H01L 21/20 and H01L 21/02365 – H01L 21/02694 should be considered in order to perform a complete search.
21/06	. . . the devices having semiconductor bodies comprising selenium or tellurium in uncombined form other than as impurities in semiconductor bodies of other materials	21/2003	. . . . . {Characterised by the substrate (H01L 21/203, H01L 21/205, H01L 21/208 take precedence) }
21/08	. . . . . Preparation of the foundation plate	21/2007	. . . . . {Bonding of semiconductor wafers to insulating substrates or to semiconducting substrates using an intermediate insulating layer (H01L 21/2011 takes precedence; bonding of semiconductor wafers to semiconductor wafers for junction formation H01L 21/187) }
21/10	. . . . . Preliminary treatment of the selenium or tellurium, its application to the foundation plate, or the subsequent treatment of the combination	21/2011	. . . . . {the substrate being of crystalline insulating material, e.g. sapphire}
21/101	. . . . . {Application of the selenium or tellurium to the foundation plate}	21/2015	. . . . . {the substrate being of crystalline semiconductor material, e.g. lattice adaptation, heteroepitaxy}
21/103	. . . . . Conversion of the selenium or tellurium to the conductive state	21/2018	. . . . . {Selective epilaxial growth, e.g. simultaneous deposition of mono - and non-mono semiconductor materials}
21/105	. . . . . Treatment of the surface of the selenium or tellurium layer after having been made conductive	21/2022	. . . . . {Epitaxial regrowth of non-monocrystalline semiconductor materials, e.g. lateral epitaxy by seeded solidification, solid-state crystallization, solid-state graphoepitaxy, explosive crystallization, grain growth in polycrystalline materials}
21/108	. . . . . Provision of discrete insulating layers, i.e. non-genetic barrier layers	21/2026	. . . . . {using a coherent energy beam, e.g. laser or electron beam}
21/12	. . . . . Application of an electrode to the exposed surface of the selenium or tellurium after the selenium or tellurium has been applied to the foundation plate	21/203	. . . . . using physical deposition, e.g. vacuum deposition, sputtering
21/14	. . . . . Treatment of the complete device, e.g. by electroforming to form a barrier		
21/145	. . . . . Ageing		
21/16	. . . the devices having semiconductor bodies comprising cuprous oxide or cuprous iodide		
21/161	. . . . . {Preparation of the foundation plate, preliminary treatment oxidation of the foundation plate, reduction treatment}		
21/162	. . . . . {Preliminary treatment of the foundation plate}		
21/164	. . . . . {Oxidation and subsequent heat treatment of the foundation plate (H01L 21/165 takes precedence) }		
21/165	. . . . . {Reduction of the copper oxide, treatment of the oxide layer}		
21/167	. . . . . {Application of a non-genetic conductive layer}		
21/168	. . . . . {Treatment of the complete device, e.g. electroforming, ageing}		

21/2033	. . . . .	{Epitaxial deposition of elements of Group IV of the Periodic System, e.g. Si, Ge}	21/2258	. . . . .	{Diffusion into or out of $A_{III}B_V$ compounds}
21/2036	. . . . .	{Epitaxial deposition of $A_{III}B_V$ compounds}	21/228	. . . . .	using diffusion into or out of a solid from or into a liquid phase, e.g. alloy diffusion processes {(H01L 21/221 - H01L 21/222 take precedence)}
21/205	. . . . .	using reduction or decomposition of a gaseous compound yielding a solid condensate, i.e. chemical deposition	21/24	. . . . .	Alloying of impurity materials, e.g. doping materials, electrode materials, with a semiconductor body {(H01L 21/182 takes precedence)}
21/2053	. . . . .	{Epitaxial deposition of elements of Group IV of the Periodic System, e.g. Si, Ge}	21/242	. . . . .	{Alloying of doping materials with $A_{III}B_V$ compounds}
21/2056	. . . . .	{Epitaxial deposition of $A_{III}B_V$ compounds}	21/244	. . . . .	{Alloying of electrode materials}
21/208	. . . . .	using liquid deposition	21/246	. . . . .	{with $A_{III}B_V$ compounds}
21/2085	. . . . .	{Epitaxial deposition of $A_{III}B_V$ compounds}	21/248	. . . . .	{Apparatus specially adapted for the alloying}
21/22	. . . . .	Diffusion of impurity materials, e.g. doping materials, electrode materials, into or out of a semiconductor body, or between semiconductor regions; {Interactions between two or more impurities; Redistribution of impurities}	21/26	. . . . .	Bombardment with radiation {(H01L 21/3105 takes precedence)}
21/2205	. . . . .	{from the substrate during epitaxy, e.g. autodoping; Preventing or using autodoping}	21/2605	. . . . .	{using natural radiation, e.g. alpha, beta or gamma radiation}
21/221	. . . . .	{of killers}	21/261	. . . . .	to produce a nuclear reaction transmuting chemical elements
21/2215	. . . . .	{in $A_{III}B_V$ compounds}	21/263	. . . . .	with high-energy radiation (H01L 21/261 takes precedence)
21/222	. . . . .	{Lithium-drift}	21/2633	. . . . .	{for etching, e.g. sputteretching}
21/2225	. . . . .	{Diffusion sources}	21/2636	. . . . .	{for heating, e.g. electron beam heating}
21/223	. . . . .	using diffusion into or out of a solid from or into a gaseous phase {(H01L 21/221 - H01L 21/222 take precedence; diffusion through an applied layer H01L 21/225)}	21/265	. . . . .	producing ion implantation
21/2233	. . . . .	{Diffusion into or out of $A_{III}B_V$ compounds}	21/26506	. . . . .	{in group IV semiconductors}
21/2236	. . . . .	{from or into a plasma phase}	21/26513	. . . . .	{of electrically active species}
21/225	. . . . .	using diffusion into or out of a solid from or into a solid phase, e.g. a doped oxide layer {(H01L 21/221 - H01L 21/222 take precedence)}	21/2652	. . . . .	{Through-implantation}
21/2251	. . . . .	{Diffusion into or out of group IV semiconductors}	21/26526	. . . . .	{Recoil-implantation}
		NOTE	21/26533	. . . . .	{of electrically inactive species in silicon to make buried insulating layers}
		{In groups	21/2654	. . . . .	{in $A_{III}B_V$ compounds}
		H01L 21/2254 - H01L 21/2257	21/26546	. . . . .	{of electrically active species}
		one should consider the main compositional parts of the applied layer just before the diffusion step}	21/26553	. . . . .	{Through-implantation}
21/2252	. . . . .	{using predeposition of impurities into the semiconductor surface, e.g. from a gaseous phase}	21/2656	. . . . .	{characterised by the implantation of both electrically active and inactive species in the same semiconductor region to be doped}
21/2253	. . . . .	{by ion implantation}	21/26566	. . . . .	{of a cluster, e.g. using a gas cluster ion beam}
21/2254	. . . . .	{from or through or into an applied layer, e.g. photoresist, nitrides}	2021/26573	. . . . .	{in diamond}
21/2255	. . . . .	{the applied layer comprising oxides only, e.g. P_2O_5 , PSG, H_3BO_3 , doped oxides}	21/2658	. . . . .	{of a molecular ion, e.g. decaborane}
21/2256	. . . . .	{through the applied layer}	21/26586	. . . . .	{characterised by the angle between the ion beam and the crystal planes or the main crystal surface}
21/2257	. . . . .	{the applied layer being silicon or silicide or SIPOS, e.g. polysilicon, porous silicon}	21/26593	. . . . .	{at a temperature lower than room temperature}
			21/266	. . . . .	using masks {(H01L 21/26586 takes precedence)}
			21/268	. . . . .	using electromagnetic radiation, e.g. laser radiation
			21/2683	. . . . .	{using X-ray lasers}
			21/2686	. . . . .	{using incoherent radiation}
			21/28	. . . . .	Manufacture of electrodes on semiconductor bodies using processes or apparatus not provided for in groups H01L 21/20 - H01L 21/268 {etching for patterning the electrodes H01L 21/311 , H01L 21/3213 ; multistep manufacturing processes for data storage electrodes H01L 29/4011 }

21/28008	{Making conductor-insulator-semiconductor electrodes}	21/28088	{the final conductor layer next to the insulator being a composite, e.g. TiN}
21/28017	{the insulator being formed after the semiconductor body, the semiconductor being silicon}	21/28097	{the final conductor layer next to the insulator being a metallic silicide}
NOTE This group covers deposition of the insulators, including epitaxial insulators, and the conductors within the same process or chamber		21/28105	{the final conductor next to the insulator having a lateral composition or doping variation, or being formed laterally by more than one deposition step}
21/28026	{characterised by the conductor (H01L 21/28176 takes precedence)}	21/28114	{characterised by the sectional shape, e.g. T, inverted-T}
NOTE When the final conductor comprises a superconductor, subject matter is not classified according to the subgroups H01L 21/28035 - H01L 21/28097 . Instead, it is classified in H01L 21/28026		NOTE Documents are also classified in groups H01L 21/28035 - H01L 21/28104 when the composition is also relevant	
21/28035	{the final conductor layer next to the insulator being silicon, e.g. polysilicon, with or without impurities (H01L 21/28105 takes precedence)}	21/28123	{Lithography-related aspects, e.g. sub-lithography lengths; Isolation-related aspects, e.g. to solve problems arising at the crossing with the side of the device isolation; Planarisation aspects}
NOTE A very thin, e.g. silicon, adhesion or seed layer is not considered as the one next to the insulator		21/28132	{conducting part of electrode is defined by a sidewall spacer or a similar technique, e.g. oxidation under mask, plating}
21/28044	{the conductor comprising at least another non-silicon conductive layer}	21/28141	{insulating part of the electrode is defined by a sidewall spacer, e.g. dummy spacer, or a similar technique, e.g. oxidation under mask, plating}
21/28052	{the conductor comprising a silicide layer formed by the silicidation reaction of silicon with a metal layer (formed by metal ion implantation H01L 21/28044)}	21/2815	{part or whole of the electrode is a sidewall spacer or made by a similar technique, e.g. transformation under mask, plating}
21/28061	{the conductor comprising a metal or metal silicide formed by deposition, e.g. sputter deposition, i.e. without a silicidation reaction (H01L 21/28052 takes precedence)}	21/28158	{Making the insulator}
NOTE To assess the coverage of groups H01L 21/28052 and H01L 21/28061 , barrier layers, e.g. TaSiN, are not considered		21/28167	{on single crystalline silicon, e.g. using a liquid, i.e. chemical oxidation}
21/2807	{the final conductor layer next to the insulator being Si or Ge or C and their alloys except Si}	21/28176	{with a treatment, e.g. annealing, after the formation of the definitive gate conductor}
21/28079	{the final conductor layer next to the insulator being a single metal, e.g. Ta, W, Mo, Al}	21/28185	{with a treatment, e.g. annealing, after the formation of the gate insulator and before the formation of the definitive gate conductor}
		21/28194	{by deposition, e.g. evaporation, ALD, CVD, sputtering, laser deposition (H01L 21/28202 takes precedence)}
		21/28202	{in a nitrogen-containing ambient, e.g. nitride deposition, growth, oxynitridation, NH ₃ nitridation, N ₂ O oxidation, thermal nitridation, RTN, plasma nitridation, RPN}

21/28211	. . . . .	{in a gaseous ambient using an oxygen or a water vapour, e.g. RTO, possibly through a layer (H01L 21/28194 and H01L 21/28202 take precedence)}	21/28568	. . . . .	{the conductive layers comprising transition metals (H01L 21/28518 takes precedence)}
		NOTE thin oxidation layers used as a barrier layer or as a buffer layer, e.g. before the formation of a high-k insulator, are classified here only if important <u>per se</u>	21/28575	. . . . .	{on semiconductor bodies comprising A _{III} B _V compounds}
21/2822	. . . . .	{with substrate doping, e.g. N, Ge, C implantation, before formation of the insulator}	21/28581	. . . . .	{Deposition of Schottky electrodes}
21/28229	. . . . .	{by deposition of a layer, e.g. metal, metal compound or polysilicon, followed by transformation thereof into an insulating layer}	21/28587	. . . . .	{characterised by the sectional shape, e.g. T, inverted T}
21/28238	. . . . .	{with sacrificial oxide}	21/28593	. . . . .	{asymmetrical sectional shape}
21/28247	. . . . .	{passivation or protection of the electrode, e.g. using re-oxidation}	21/288	. . . . .	from a liquid, e.g. electrolytic deposition
21/28255	. . . . .	{the insulator being formed after the semiconductor body, the semiconductor belonging to Group IV and not being elemental silicon, e.g. Ge, SiGe, SiGeC}	21/2885	. . . . .	{using an external electrical current, i.e. electro-deposition}
21/28264	. . . . .	{the insulator being formed after the semiconductor body, the semiconductor being a III-V compound}	21/30	. . . .	Treatment of semiconductor bodies using processes or apparatus not provided for in groups H01L 21/20 - H01L 21/26 (manufacture of electrodes thereon H01L 21/28)
21/283	. . . . .	Deposition of conductive or insulating materials for electrodes {conducting electric current}	21/3003	. . . . .	{Hydrogenation or deuteration, e.g. using atomic hydrogen from a plasma}
21/285	. . . . .	from a gas or vapour, e.g. condensation	21/3006	. . . . .	{of A _{III} B _V compounds}
21/28506	. . . . .	{of conductive layers}	21/302	. . . . .	to change their surface-physical characteristics or shape, e.g. etching, polishing, cutting
21/28512	. . . . .	{on semiconductor bodies comprising elements of Group IV of the Periodic System}	21/304	. . . . .	Mechanical treatment, e.g. grinding, polishing, cutting {(H01L 21/30625 takes precedence)}
21/28518	. . . . .	{the conductive layers comprising silicides (H01L 21/28537 takes precedence)}	21/3043	. . . . .	{Making grooves, e.g. cutting}
21/28525	. . . . .	{the conductive layers comprising semiconducting material (H01L 21/28518 , H01L 21/28537 take precedence)}	21/3046	. . . . .	{using blasting, e.g. sand-blasting (H01L 21/2633 takes precedence)}
21/28531	. . . . .	{Making of side-wall contacts}	21/306	. . . . .	Chemical or electrical treatment, e.g. electrolytic etching (to form insulating layers H01L 21/31)
21/28537	. . . . .	{Deposition of Schottky electrodes}	21/30604	. . . . .	{Chemical etching}
21/2855	. . . . .	{by physical means, e.g. sputtering, evaporation (H01L 21/28518 - H01L 21/28537 and H01L 21/28568 take precedence)}	21/30608	. . . . .	{Anisotropic liquid etching (H01L 21/3063 takes precedence)}
21/28556	. . . . .	{by chemical means, e.g. CVD, LPCVD, PECVD, laser CVD (H01L 21/28518 - H01L 21/28537 and H01L 21/28568 take precedence)}	21/30612	. . . . .	{Etching of A _{III} B _V compounds}
21/28562	. . . . .	{Selective deposition}	21/30617	. . . . .	{Anisotropic liquid etching}
			21/30621	. . . . .	{Vapour phase etching}
			21/30625	. . . . .	{With simultaneous mechanical treatment, e.g. mechanico-chemical polishing}
			21/3063	. . . . .	Electrolytic etching
			21/30635	. . . . .	{of A _{III} B _V compounds}
			21/3065	. . . . .	Plasma etching; Reactive-ion etching
			21/30655	. . . . .	{comprising alternated and repeated etching and passivation steps, e.g. Bosch process}
			21/308	. . . . .	using masks (H01L 21/3063 , H01L 21/3065 take precedence)
			21/3081	. . . . .	{characterised by their composition, e.g. multilayer masks, materials}
			21/3083	. . . . .	{characterised by their size, orientation, disposition, behaviour, shape, in horizontal or vertical plane}
			21/3085	. . . . .	{characterised by their behaviour during the process, e.g. soluble masks, redeposited masks}

- 21/3086 {characterised by the process involved to create the mask, e.g. lift-off masks, sidewalls, or to modify the mask, e.g. pre-treatment, post-treatment}
- 21/3088 {Process specially adapted to improve the resolution of the mask}
- 21/31 to form insulating layers thereon, e.g. for masking or by using photolithographic techniques ([encapsulating layers H01L 21/56](#)); After treatment of these layers; Selection of materials for these layers
- 21/3105 After-treatment
- 21/31051 {Planarisation of the insulating layers ([H01L 21/31058 takes precedence](#))}
- 21/31053 {involving a dielectric removal step}
- 21/31055 {the removal being a chemical etching step, e.g. dry etching ([etching per se H01L 21/311](#))}
- 21/31056 {the removal being a selective chemical etching step, e.g. selective dry etching through a mask}
- 21/31058 {of organic layers}
- 21/311 Etching the insulating layers {by chemical or physical means ([H01L 21/31058 takes precedence](#))}
- 21/31105 {Etching inorganic layers}
- 21/31111 {by chemical means}
- 21/31116 {by dry-etching}
- 21/31122 {of layers not containing Si, e.g. PZT, Al₂O₃}
- 21/31127 {Etching organic layers}
- 21/31133 {by chemical means}
- 21/31138 {by dry-etching}
- 21/31144 {using masks}
- 21/3115 Doping the insulating layers
- 21/31155 {by ion implantation}
- 21/312 Organic layers, e.g. photoresist ([H01L 21/3105](#), [H01L 21/32 take precedence](#); [photoresists per se G03C](#))
- (Frozen)

WARNING

Groups [H01L 21/312](#) – [H01L 21/3128](#) are no longer used for the classification of documents as of May 1, 2011. The content of these groups is being reclassified into groups [H01L 21/02107](#) – [H01L 21/02326](#).

Groups [H01L 21/02107](#) – [H01L 21/02326](#) should be considered in order to perform a complete search.

- 21/3121 {Layers comprising organo-silicon compounds} (Frozen)
- 21/3122 {layers comprising polysiloxane compounds} (Frozen)
- 21/3124 {layers comprising hydrogen silsesquioxane} (Frozen)

- 21/3125 {layers comprising silazane compounds} (Frozen)
- 21/3127 {Layers comprising fluoro (hydro)carbon compounds, e.g. polytetrafluoroethylene} (Frozen)
- 21/3128 {by Langmuir-Blodgett techniques} (Frozen)
- 21/314 Inorganic layers ([H01L 21/3105](#), [H01L 21/32 take precedence](#)) (Frozen)

WARNING

Groups [H01L 21/314](#) – [H01L 21/3185](#) are no longer used for the classification of documents as of May 1, 2011. The content of these group is being reclassified into group [H01L 21/02107](#) – [H01L 21/02326](#).

Groups [H01L 21/02107](#) – [H01L 21/02326](#) should be considered in order to perform a complete search.

- 21/3141 {Deposition using atomic layer deposition techniques [ALD]} (Frozen)
- 21/3142 {of nano-laminates, e.g. alternating layers of Al₂O₃-HfO₂} (Frozen)
- 21/3143 {composed of alternated layers or of mixtures of nitrides and oxides or of oxinitrides, e.g. formation of oxinitride by oxidation of nitride layers} (Frozen)
- 21/3144 {on silicon} (Frozen)
- 21/3145 {formed by deposition from a gas or vapour} (Frozen)
- 21/3146 {Carbon layers, e.g. diamond-like layers} (Frozen)
- 21/3147 {Epitaxial deposition of insulating materials} (Frozen)
- 21/3148 {Silicon Carbide layers} (Frozen)
- 2021/3149 {Langmuir-Blodgett techniques} (Frozen)
- 21/316 composed of oxides or glassy oxides or oxide based glass (Frozen)

WARNING

Group [H01L 21/316](#) is no longer used for the classification of documents as of May 1, 2011. The content of this group is being reclassified into groups [H01L 21/02107](#) – [H01L 21/02326](#).

Groups [H01L 21/02107](#) – [H01L 21/02326](#) should be considered in order to perform a complete search.

- 21/31604 {Deposition from a gas or vapour ([H01L 21/31691](#), [H01L 21/31695 take precedence](#))} (Frozen)
- 21/31608 {Deposition of SiO₂ ([H01L 21/31625](#), [H01L 21/31629](#) and [H01L 21/31633 take precedence](#))} (Frozen)

21/31612	. . . . .	{on a silicon body}
(Frozen)		
21/31616	. . . . .	{Deposition of Al ₂ O ₃ }
(Frozen)		
21/3162	. . . . .	{on a silicon body}
(Frozen)		
21/31625	. . . . .	{Deposition of boron or phosphorus doped silicon oxide, e.g. BSG, PSG, BPSG}
(Frozen)		
21/31629	. . . . .	{Deposition of halogen doped silicon oxide, e.g. fluorine doped silicon oxide}
(Frozen)		
21/31633	. . . . .	{Deposition of carbon doped silicon oxide, e.g. SiOC}
(Frozen)		
21/31637	. . . . .	{Deposition of Tantalum oxides, e.g. Ta ₂ O ₅ }
(Frozen)		
21/31641	. . . . .	{Deposition of Zirconium oxides, e.g. ZrO ₂ }
(Frozen)		
21/31645	. . . . .	{Deposition of Hafnium oxides, e.g. HfO ₂ }
(Frozen)		
21/3165	. . . . .	{formed by oxidation (H01L 21/31691 , H01L 21/31695 take precedence)}
(Frozen)		
21/31654	. . . . .	{of semiconductor materials, e.g. the body itself}
(Frozen)		
21/31658	. . . . .	{by thermal oxidation, e.g. of SiGe}
(Frozen)		
21/31662	. . . . .	{of silicon in uncombined form}
(Frozen)		
21/31666	. . . . .	{of AIII BV compounds}
(Frozen)		
21/3167	. . . . .	{of anodic oxidation}
(Frozen)		
21/31675	. . . . .	{of silicon}
(Frozen)		
21/31679	. . . . .	{of AIII BV compounds}
(Frozen)		
21/31683	. . . . .	{of metallic layers, e.g. Al deposited on the body, e.g. formation of multi-layer insulating structures}
(Frozen)		
21/31687	. . . . .	{by anodic oxidation}
(Frozen)		
21/31691	. . . . .	{with perovskite structure}
(Frozen)		
21/31695	. . . . .	{Deposition of porous oxides or porous glassy oxides or oxide based porous glass}
(Frozen)		
21/318	. . . . .	composed of nitrides
(Frozen)		

WARNING

Group [H01L 21/318](#) is no longer used for the classification of documents as of May 1, 2011. The content of this group is being reclassified into groups [H01L 21/02107](#) – [H01L 21/02326](#).

Groups [H01L 21/02107](#) – [H01L 21/02326](#) should be considered in order to perform a complete search.

21/3185	. . . . .	{of siliconnitrides}
(Frozen)		
21/32	. . . . .	using masks

21/3205	. . . . .	Deposition of non-insulating-, e.g. conductive- or resistive-, layers on insulating layers; After-treatment of these layers (manufacture of electrodes H01L 21/28)
21/32051	. . . . .	{Deposition of metallic or metal-silicide layers}
21/32053	. . . . .	{of metal-silicide layers}
21/32055	. . . . .	{Deposition of semiconductive layers, e.g. poly - or amorphous silicon layers}
21/32056	. . . . .	{Deposition of conductive or semi-conductive organic layers (H01L 21/32058 takes precedence)}
21/32058	. . . . .	{Deposition of superconductive layers}
21/321	. . . . .	After treatment
21/32105	. . . . .	{Oxidation of silicon-containing layers}
21/3211	. . . . .	{Nitridation of silicon-containing layers}
21/32115	. . . . .	{Planarisation}
21/3212	. . . . .	{by chemical mechanical polishing [CMP]}
21/32125	. . . . .	{by simultaneously passing an electrical current, i.e. electrochemical mechanical polishing, e.g. ECMP}
21/3213	. . . . .	Physical or chemical etching of the layers, e.g. to produce a patterned layer from a pre-deposited extensive layer
21/32131	. . . . .	{by physical means only}
21/32132	. . . . .	{of silicon-containing layers}
21/32133	. . . . .	{by chemical means only}
21/32134	. . . . .	{by liquid etching only}
21/32135	. . . . .	{by vapour etching only}
21/32136	. . . . .	{using plasmas}
21/32137	. . . . .	{of silicon-containing layers}
21/32138	. . . . .	{pre- or post-treatments, e.g. anti-corrosion processes}
21/32139	. . . . .	{using masks}
21/3215	. . . . .	Doping the layers
21/32155	. . . . .	{Doping polycrystalline - or amorphous silicon layers}
21/322	. . . . .	to modify their internal properties, e.g. to produce internal imperfections
21/3221	. . . . .	{of silicon bodies, e.g. for gettering}
21/3223	. . . . .	{using cavities formed by hydrogen or noble gas ion implantation}
21/3225	. . . . .	{Thermally inducing defects using oxygen present in the silicon body for intrinsic gettering (H01L 21/3226 takes precedence)}
NOTE		
Gettering using both extrinsic and intrinsic gettering techniques is classified in both H01L 21/3221 and H01L 21/3225		
21/3226	. . . . .	{of silicon on insulator}
21/3228	. . . . .	{of AIII BV compounds, e.g. to make them semi-insulating}

- 21/324 Thermal treatment for modifying the properties of semiconductor bodies, e.g. annealing, sintering ([H01L 21/20](#) - [H01L 21/288](#) and [H01L 21/302](#) - [H01L 21/322](#) take precedence)
- 21/3242 {for the formation of PN junctions without addition of impurities ([H01L 21/22](#) takes precedence)}
- 21/3245 {of $A_{III}B_V$ compounds}
- 21/3247 {for altering the shape, e.g. smoothing the surface}
- WARNING**
- Group [H01L 21/3247](#) is incomplete pending reclassification of documents from group [H01L 21/324](#).
- Groups [H01L 21/324](#) and [H01L 21/3247](#) should be considered in order to perform a complete search.
- 21/326 Application of electric currents or fields, e.g. for electroforming ([H01L 21/20](#) - [H01L 21/288](#) and [H01L 21/302](#) - [H01L 21/324](#) take precedence)
- 21/34 . . . the devices having semiconductor bodies not provided for in groups {[H01L 21/0405](#), [H01L 21/0445](#)}, [H01L 21/06](#), [H01L 21/16](#) and [H01L 21/18](#) with or without impurities, e.g. doping materials
- 21/38 Diffusion of impurity materials, e.g. doping materials, electrode materials, into or out of a semiconductor body, or between semiconductor regions
- 21/383 using diffusion into or out of a solid from or into a gaseous phase
- 21/385 using diffusion into or out of a solid from or into a solid phase, e.g. a doped oxide layer
- 21/388 using diffusion into or out of a solid from or into a liquid phase, e.g. alloy diffusion processes
- 21/40 Alloying of impurity materials, e.g. doping materials, electrode materials, with a semiconductor body
- 21/42 Bombardment with radiation
- 21/423 with high-energy radiation
- 21/425 producing ion implantation
- 21/426 using masks
- 21/428 using electromagnetic radiation, e.g. laser radiation
- 21/44 Manufacture of electrodes on semiconductor bodies using processes or apparatus not provided for in groups [H01L 21/38](#) - [H01L 21/428](#)
- 21/441 Deposition of conductive or insulating materials for electrodes
- 21/443 from a gas or vapour, e.g. condensation
- 21/445 from a liquid, e.g. electrolytic deposition
- 21/447 involving the application of pressure, e.g. thermo-compression bonding
- 21/449 involving the application of mechanical vibrations, e.g. ultrasonic vibrations

- 21/46 Treatment of semiconductor bodies using processes or apparatus not provided for in groups [H01L 21/428](#) (manufacture of electrodes thereon [H01L 21/44](#))
- 21/461 to change their surface-physical characteristics or shape, e.g. etching, polishing, cutting
- 21/463 Mechanical treatment, e.g. grinding, ultrasonic treatment
- 21/465 Chemical or electrical treatment, e.g. electrolytic etching (to form insulating layers [H01L 21/469](#))
- 21/467 using masks
- 21/469 to form insulating layers thereon, e.g. for masking or by using photolithographic techniques (encapsulating layers [H01L 21/56](#)); After-treatment of these layers
- 21/47 Organic layers, e.g. photoresist ([H01L 21/475](#), [H01L 21/4757](#) take precedence)
- 21/471 Inorganic layers ([H01L 21/475](#), [H01L 21/4757](#) take precedence)
- 21/473 composed of oxides or glassy oxides or oxide based glass
- 21/475 using masks
- 21/4757 After-treatment
- 21/47573 {Etching the layer}
- 21/47576 {Doping the layer}
- 21/4763 Deposition of non-insulating, e.g. conductive -, resistive -, layers on insulating layers; After-treatment of these layers (manufacture of electrodes [H01L 21/28](#), {[H01L 21/44](#)})
- 21/47635 {After-treatment of these layers}
- 21/477 Thermal treatment for modifying the properties of semiconductor bodies, e.g. annealing, sintering ([H01L 21/38](#) - [H01L 21/449](#) and [H01L 21/461](#) - [H01L 21/475](#) take precedence)
- 21/479 Application of electric currents or fields, e.g. for electroforming ([H01L 21/38](#) - [H01L 21/449](#) and [H01L 21/461](#) - [H01L 21/475](#) take precedence)
- 21/48 . . . Manufacture or treatment of parts, e.g. containers, prior to assembly of the devices, using processes not provided for in a single one of the subgroups [H01L 21/06](#) - [H01L 21/326](#)
- NOTE**
- In this group, the expression "treatment" covers also the removal of leads from parts
- 21/4803 {Insulating or insulated parts, e.g. mountings, containers, diamond heatsinks ([H01L 21/4846](#) takes precedence; printed circuit boards [H05K 1/00](#))}
- 21/4807 {Ceramic parts}
- 21/481 {Insulating layers on insulating parts, with or without metallisation}
- 21/4814 {Conductive parts}
- 21/4817 {for containers, e.g. caps ([H01L 21/4871](#) takes precedence)}

21/4821	. . . . .	{Flat leads, e.g. lead frames with or without insulating supports}	21/54	. . . . .	Providing fillings in containers, e.g. gas fillings
21/4825	. . . . .	{Connection or disconnection of other leads to or from flat leads, e.g. wires, bumps, other flat leads}	21/56	. . . . .	Encapsulations, e.g. encapsulation layers, coatings
21/4828	. . . . .	{Etching (etching for cleaning without patterning H01L 21/4835)}	21/561	. . . . .	{Batch processing}
21/4832	. . . . .	{Etching a temporary substrate after encapsulation process to form leads}	21/563	. . . . .	{Encapsulation of active face of flip-chip device, e.g. underfilling or underencapsulation of flip-chip, encapsulation preform on chip or mounting substrate}
21/4835	. . . . .	{Cleaning, e.g. removing of solder}	21/565	. . . . .	{Moulds}
21/4839	. . . . .	{Assembly of a flat lead with an insulating support, e.g. for TAB}	21/566	. . . . .	{Release layers for moulds, e.g. release layers, layers against residue during moulding}
21/4842	. . . . .	{Mechanical treatment, e.g. punching, cutting, deforming, cold welding}	21/568	. . . . .	{Temporary substrate used as encapsulation process aid (H01L 21/4832 and H01L 21/566 take precedence)}
21/4846	. . . . .	{Leads on or in insulating or insulated substrates, e.g. metallisation (H01L 21/4821 takes precedence; metallisation of ceramics in general C04B 41/51 ; printed circuits H05K 3/00)}	21/60	. . . . .	Attaching {or detaching} leads or other conductive members, to be used for carrying current to or from the device in operation
21/485	. . . . .	{Adaptation of interconnections, e.g. engineering charges, repair techniques}	2021/60007	. . . . .	{involving a soldering or an alloying process}
21/4853	. . . . .	{Connection or disconnection of other leads to or from a metallisation, e.g. pins, wires, bumps}	2021/60015	. . . . .	{using plate connectors, e.g. layer, film}
21/4857	. . . . .	{Multilayer substrates (multilayer metallisation on monolayer substrate H01L 21/4846)}	2021/60022	. . . . .	{using bump connectors, e.g. for flip chip mounting}
21/486	. . . . .	{Via connections through the substrate with or without pins}	2021/6003	. . . . .	{Apparatus therefor}
21/4864	. . . . .	{Cleaning, e.g. removing of solder}	2021/60037	. . . . .	{Right-up bonding}
21/4867	. . . . .	{Applying pastes or inks, e.g. screen printing (H01L 21/486 takes precedence)}	2021/60045	. . . . .	{Pre-treatment step of the bump connectors prior to bonding}
21/4871	. . . . .	{Bases, plates or heatsinks}	2021/60052	. . . . .	{Oxide removing step, e.g. flux, rosin}
21/4875	. . . . .	{Connection or disconnection of other leads to or from bases or plates}	2021/6006	. . . . .	{with temporary supporting member not part of an apparatus, e.g. removable coating, film or substrate}
21/4878	. . . . .	{Mechanical treatment, e.g. deforming}	2021/60067	. . . . .	{Aligning the bump connectors with the mounting substrate}
21/4882	. . . . .	{Assembly of heatsink parts}	2021/60075	. . . . .	{involving active alignment, i.e. by apparatus steering, e.g. using alignment marks, sensors}
21/4885	. . . . .	{Wire-like parts or pins (wire ball formation B23K 20/00 ; methods related to connecting semiconductor or other solid state bodies H01L 24/00)}	2021/60082	. . . . .	{involving passive alignment, e.g. using surface energy, chemical reactions, thermal equilibrium}
21/4889	. . . . .	{Connection or disconnection of other leads to or from wire-like parts, e.g. wires}	2021/6009	. . . . .	{involving guiding structures, e.g. structures that are left at least partly in the bonded product, spacers}
21/4892	. . . . .	{Cleaning}	2021/60097	. . . . .	{Applying energy, e.g. for the soldering or alloying process}
21/4896	. . . . .	{Mechanical treatment, e.g. cutting, bending}	2021/60105	. . . . .	{using electromagnetic radiation}
21/50	. . . . .	Assembly of semiconductor devices using processes or apparatus not provided for in a single one of the subgroups H01L 21/06 - H01L 21/326 , {e.g. sealing of a cap to a base of a container}	2021/60112	. . . . .	{Coherent radiation, i.e. laser beam}
NOTE Arrangements for connecting or disconnecting semiconductor or other solid state bodies, or methods related thereto, other than those arrangements or methods covered by the following subgroups, are covered by H01L 24/00			2021/6012	. . . . .	{Incoherent radiation, e.g. polychromatic heating lamp}
			2021/60127	. . . . .	{Induction heating, i.e. eddy currents}
			2021/60135	. . . . .	{using convection, e.g. reflow oven}
			2021/60142	. . . . .	{with a graded temperature profile}
			2021/6015	. . . . .	{using conduction, e.g. chuck heater, thermocompression}
			2021/60157	. . . . .	{with a graded temperature profile}
			2021/60165	. . . . .	{using an electron beam}
21/52	. . . . .	Mounting semiconductor bodies in containers	2021/60172	. . . . .	{using static pressure}

2021/6018	. . . . .	{Unidirectional static pressure}	21/67	. . . . .	Apparatus specially adapted for handling semiconductor or electric solid state devices during manufacture or treatment thereof; Apparatus specially adapted for handling wafers during manufacture or treatment of semiconductor or electric solid state devices or components {;
2021/60187	. . . . .	{Isostatic pressure, e.g. degassing using vacuum or pressurised liquid}			Apparatus not specifically provided for elsewhere (processes per se H01L 21/30 , H01L 21/46 , H01L 23/00 ; simple temporary support means, e.g. using adhesives, electric or magnetic means H01L 21/68 , H01L 21/302 ; apparatus for manufacturing arrangements for connecting or disconnecting semiconductor or solid-state bodies and for methods related thereto H01L 24/74 ;)}
2021/60195	. . . . .	{using dynamic pressure, e.g. ultrasonic or thermosonic bonding}			NOTE
2021/60202	. . . . .	{using a protective atmosphere, e.g. with forming or shielding gas}			In this subgroup the term substrate designates a semiconductor or electric solid state device or component, or a wafer
2021/6021	. . . . .	{using an autocatalytic reaction}			
2021/60217	. . . . .	{Detaching bump connectors, e.g. after testing}			
2021/60225	. . . . .	{Arrangement of bump connectors prior to mounting}			
2021/60232	. . . . .	{wherein the bump connectors are disposed only on the semiconductor chip}			
2021/6024	. . . . .	{wherein the bump connectors are disposed only on the mounting substrate}			
2021/60247	. . . . .	{wherein the bump connectors are disposed on both the semiconductor chip and the mounting substrate, e.g. bump to bump}	21/67005	. . . . .	{Apparatus not specifically provided for elsewhere (processes per se H01L 21/30 , H01L 21/46 , H01L 23/00 ; simple temporary support means, e.g. using adhesives, electric or magnetic means H01L 21/68 , H01L 21/302)}
2021/60255	. . . . .	{wherein the bump connectors are provided as prepeg, e.g. are provided in an insulating plate member}	21/67011	. . . . .	{Apparatus for manufacture or treatment (processes H01L 21/30 , H01L 21/46 ; for production or after-treatment of single crystals or homogeneous polycrystalline material C30B 35/00)}
2021/60262	. . . . .	{Lateral distribution of bump connectors prior to mounting}	21/67017	. . . . .	{Apparatus for fluid treatment (H01L 21/67126 , H01L 21/6715 take precedence)}
2021/6027	. . . . .	{Mounting on semiconductor conductive members}	21/67023	. . . . .	{for general liquid treatment, e.g. etching followed by cleaning}
2021/60277	. . . . .	{involving the use of conductive adhesives}	21/67028	. . . . .	{for cleaning followed by drying, rinsing, stripping, blasting or the like}
2021/60285	. . . . .	{involving the use of mechanical auxiliary parts without the use of an alloying or soldering process, e.g. pressure contacts}	21/67034	. . . . .	{for drying}
2021/60292	. . . . .	{involving the use of an electron or laser beam}	21/6704	. . . . .	{for wet cleaning or washing}
21/603	. . . . .	involving the application of pressure, e.g. thermo-compression bonding (H01L 21/607 takes precedence)	21/67046	. . . . .	{using mainly scrubbing means, e.g. brushes}
21/607	. . . . .	involving the application of mechanical vibrations, e.g. ultrasonic vibrations	21/67051	. . . . .	{using mainly spraying means, e.g. nozzles}
21/62	. . . . .	the devices having no potential-jump barriers or surface barriers	21/67057	. . . . .	{with the semiconductor substrates being dipped in baths or vessels}
21/64	. . . . .	Manufacture or treatment of solid state devices other than semiconductor devices, or of parts thereof, not peculiar to a single device provided for in groups H01L 31/00 - H01L 51/00	21/67063	. . . . .	{for etching}
			21/67069	. . . . .	{for drying etching}
			21/67075	. . . . .	{for wet etching}
			21/6708	. . . . .	{using mainly spraying means, e.g. nozzles}
			21/67086	. . . . .	{with the semiconductor substrates being dipped in baths or vessels}
			21/67092	. . . . .	{Apparatus for mechanical treatment (or grinding or cutting, see the relevant groups in subclasses B24B or B28D)}
			21/67098	. . . . .	{Apparatus for thermal treatment}
			21/67103	. . . . .	{mainly by conduction}
			21/67109	. . . . .	{mainly by convection}
			21/67115	. . . . .	{mainly by radiation}
			21/67121	. . . . .	{Apparatus for making assemblies not otherwise provided for, e.g. package constructions}
			21/67126	. . . . .	{Apparatus for sealing, encapsulating, glassing, decapsulating or the like (processes H01L 23/02 , H01L 23/28)}

- 21/67132 {Apparatus for placing on an insulating substrate, e.g. tape}
- 21/67138 {Apparatus for wiring semiconductor or solid state device}
- 21/67144 {Apparatus for mounting on conductive members, e.g. leadframes or conductors on insulating substrates}
- 21/6715 {Apparatus for applying a liquid, a resin, an ink or the like ([H01L 21/67126 takes precedence](#))}
- 21/67155 {Apparatus for manufacturing or treating in a plurality of work-stations}
- 21/67161 {characterized by the layout of the process chambers}
- 21/67167 {surrounding a central transfer chamber}
- 21/67173 {in-line arrangement}
- 21/67178 {vertical arrangement}
- 21/67184 {characterized by the presence of more than one transfer chamber}
- 21/6719 {characterized by the construction of the processing chambers, e.g. modular processing chambers}
- 21/67196 {characterized by the construction of the transfer chamber}
- 21/67201 {characterized by the construction of the load-lock chamber}
- 21/67207 {comprising a chamber adapted to a particular process}
- 21/67213 {comprising at least one ion or electron beam chamber ([coating by ion implantation C23C](#); [ion or electron beam tubes H01J 37/00](#))}
- 21/67219 {comprising at least one polishing chamber ([polishing apparatuses B24B](#))}
- 21/67225 {comprising at least one lithography chamber ([lithographic apparatuses G03F 7/00](#))}
- 21/6723 {comprising at least one plating chamber ([electroless plating apparatuses C23C](#), [electroplating apparatuses C25D](#))}
- 21/67236 {the substrates being processed being not semiconductor wafers, e.g. leadframes or chips}
- 21/67242 . . . {Apparatus for monitoring, sorting or marking ([testing or measuring during manufacture H01L 22/00](#), [marks per se H01L 23/544](#); [testing individual semiconductor devices G01R 31/26](#))}
- 21/67248 {Temperature monitoring}
- 21/67253 {Process monitoring, e.g. flow or thickness monitoring}
- 21/67259 {Position monitoring, e.g. misposition detection or presence detection}
- 21/67265 {of substrates stored in a container, a magazine, a carrier, a boat or the like}
- 21/67271 {Sorting devices}
- 21/67276 {Production flow monitoring, e.g. for increasing throughput ([program-control systems per se G05B 19/00](#), [e.g. total factory control G05B 19/418](#))}
- 21/67282 {Marking devices}
- 21/67288 {Monitoring of warpage, curvature, damage, defects or the like}
- 21/67294 {using identification means, e.g. labels on substrates or labels on containers}
- 21/673 . . . using specially adapted carriers {or holders; [Fixing the workpieces on such carriers or holders \(holders for supporting a complete device in operation H01L 23/32\)](#)}
- 21/67303 . . . {Vertical boat type carrier whereby the substrates are horizontally supported, e.g. comprising rod-shaped elements}
- 21/67306 {characterized by a material, a roughness, a coating or the like}
- 21/67309 {characterized by the substrate support}
- 21/67313 . . . {Horizontal boat type carrier whereby the substrates are vertically supported, e.g. comprising rod-shaped elements}
- 21/67316 {characterized by a material, a roughness, a coating or the like}
- 21/6732 . . . {Vertical carrier comprising wall type elements whereby the substrates are horizontally supported, e.g. comprising sidewalls}
- 21/67323 {characterized by a material, a roughness, a coating or the like}
- 21/67326 . . . {Horizontal carrier comprising wall type elements whereby the substrates are vertically supported, e.g. comprising sidewalls}
- 21/6733 {characterized by a material, a roughness, a coating or the like}
- 21/67333 . . . {Trays for chips ([magazine for components H05K 13/0084](#))}
- 21/67336 {characterized by a material, a roughness, a coating or the like}
- 21/6734 . . . {specially adapted for supporting large square shaped substrates ([containers and packaging elements for glass sheets B65D 85/48](#), [transporting of glass products during their manufacture C03B 35/00](#))}
- 21/67343 {characterized by a material, a roughness, a coating or the like}
- 21/67346 . . . {characterized by being specially adapted for supporting a single substrate or by comprising a stack of such individual supports}
- 21/6735 . . . {Closed carriers}
- 21/67353 {specially adapted for a single substrate}
- 21/67356 {specially adapted for containing chips, dies or ICs}
- 21/67359 {specially adapted for containing masks, reticles or pellicles}
- 21/67363 {specially adapted for containing substrates other than wafers ([H01L 21/67356](#), [H01L 21/67359 take precedence](#))}
- 21/67366 {characterised by materials, roughness, coatings or the like ([materials relating to an injection moulding process B29C 45/00](#); [chemical composition of materials C08L 51/00](#))}
- 21/67369 {characterised by shock absorbing elements, e.g. retainers or cushions}
- 21/67373 {characterised by locking systems}
- 21/67376 {characterised by sealing arrangements}
- 21/67379 {characterised by coupling elements, kinematic members, handles or elements to be externally gripped}

- 21/67383 {characterised by substrate supports}
 - 21/67386 {characterised by the construction of the closed carrier}
 - 21/67389 {characterised by atmosphere control}
 - 21/67393 {characterised by the presence of atmosphere modifying elements inside or attached to the closed carrier}
 - 21/67396 {characterised by the presence of antistatic elements}
 - 21/677 . . . for conveying, e.g. between different workstations
 - 21/67703 . . . {between different workstations}
 - 21/67706 {Mechanical details, e.g. roller, belt ([H01L 21/67709 takes precedence](#))}
 - 21/67709 {using magnetic elements}
 - 21/67712 {the substrate being handled substantially vertically}
 - 21/67715 {Changing the direction of the conveying path}
 - 21/67718 {Changing orientation of the substrate, e.g. from a horizontal position to a vertical position}
 - 21/67721 {the substrates to be conveyed not being semiconductor wafers or large planar substrates, e.g. chips, lead frames ([H01L 21/6773 takes precedence](#))}
 - 21/67724 {by means of a cart or a vehicle}
 - 21/67727 {using a general scheme of a conveying path within a factory}
 - 21/6773 {Conveying cassettes, containers or carriers}
 - 21/67733 {Overhead conveying}
 - 21/67736 {Loading to or unloading from a conveyor}
 - 21/67739 . . . {into and out of processing chamber}
 - 21/67742 {Mechanical parts of transfer devices ([robots in general in B25J](#))}
 - 21/67745 {characterized by movements or sequence of movements of transfer devices}
 - 21/67748 {horizontal transfer of a single workpiece}
 - 21/67751 {vertical transfer of a single workpiece}
 - 21/67754 {horizontal transfer of a batch of workpieces}
 - 21/67757 {vertical transfer of a batch of workpieces}
 - 21/6776 {Continuous loading and unloading into and out of a processing chamber, e.g. transporting belts within processing chambers}
 - 21/67763 . . . {the wafers being stored in a carrier, involving loading and unloading ([H01L 21/6779 takes precedence](#))}
 - 21/67766 {Mechanical parts of transfer devices ([robots in general in B25J](#))}
 - 21/67769 {Storage means}
 - 21/67772 {involving removal of lid, door, cover}
 - 21/67775 {Docking arrangements}
 - 21/67778 {involving loading and unloading of wafers}
 - 21/67781 {Batch transfer of wafers}
 - 21/67784 . . . {using air tracks}
 - 21/67787 {with angular orientation of the workpieces}
 - 21/6779 {the workpieces being stored in a carrier, involving loading and unloading}
 - 21/67793 . . . {with orientating and positioning by means of a vibratory bowl or track}
 - 21/67796 . . . {with angular orientation of workpieces ([H01L 21/67787](#) and [H01L 21/67793 take precedence](#))}
 - 21/68 . . . for positioning, orientation or alignment
 - 21/681 . . . {using optical controlling means}
 - 21/682 . . . {Mask-wafer alignment ([in general G03F 7/70, G03F 9/70](#))}
 - 21/683 . . . for supporting or gripping ([for conveying H01L 21/677, for positioning, orientation or alignment H01L 21/68](#))
 - 21/6831 . . . {using electrostatic chucks}
 - 21/6833 {Details of electrostatic chucks}
 - 21/6835 . . . {using temporarily an auxiliary support}
- NOTE**
- [H01L 21/6835](#), details of the apparatus are to be further indexed using the indexing codes chosen from [H01L 2221/68304](#) and subgroups
- 21/6836 {Wafer tapes, e.g. grinding or dicing support tapes ([adhesive tapes in general C09J 7/20](#))}
 - 21/6838 . . . {with gripping and holding devices using a vacuum; Bernoulli devices}
 - 21/687 . . . using mechanical means, e.g. chucks, clamps or pinches ([using electrostatic chucks H01L 21/6831](#))}
 - 21/68707 {the wafers being placed on a robot blade, or gripped by a gripper for conveyance}
 - 21/68714 {the wafers being placed on a susceptor, stage or support}
 - 21/68721 {characterised by edge clamping, e.g. clamping ring}
 - 21/68728 {characterised by a plurality of separate clamping members, e.g. clamping fingers}
 - 21/68735 {characterised by edge profile or support profile}
 - 21/68742 {characterised by a lifting arrangement, e.g. lift pins}
 - 21/6875 {characterised by a plurality of individual support members, e.g. support posts or protrusions}
 - 21/68757 {characterised by a coating or a hardness or a material}
 - 21/68764 {characterised by a movable susceptor, stage or support, others than those only rotating on their own vertical axis, e.g. susceptors on a rotating carousel}
 - 21/68771 {characterised by supporting more than one semiconductor substrate}
 - 21/68778 {characterised by supporting substrates others than wafers, e.g. chips}
 - 21/68785 {characterised by the mechanical construction of the susceptor, stage or support}
 - 21/68792 {characterised by the construction of the shaft}

21/70	. . . . . Manufacture or treatment of devices consisting of a plurality of solid state components formed in or on a common substrate or of parts thereof; Manufacture of integrated circuit devices or of parts thereof ({multistep manufacturing processes of assemblies consisting of a plurality of individual semiconductor or other solid state devices H01L 25/00; } manufacture of assemblies consisting of preformed electrical components H05K 3/00 , H05K 13/00)	21/76218	. . . . . {introducing both types of electrical active impurities in the local oxidation region for the sole purpose of creating channel stoppers, e.g. for isolation of complementary doped regions}
21/702	. . . {of thick-or thin-film circuits or parts thereof}	21/76221	. . . . . {with a plurality of successive local oxidation steps}
21/705	. . . {of thick-film circuits or parts thereof}	21/76224	. . . . . {using trench refilling with dielectric materials (trench filling with polycrystalline silicon H01L 21/763; together with vertical isolation, e.g. trench refilling in a SOI substrate H01L 21/76264)}
21/707	. . . {of thin-film circuits or parts thereof}	21/76227	. . . . . {the dielectric materials being obtained by full chemical transformation of non-dielectric materials, such as polycrystalline silicon, metals}
21/71	. . . Manufacture of specific parts of devices defined in group H01L 21/70 ({H01L 21/0405, H01L 21/0445}), H01L 21/28 , H01L 21/44 , H01L 21/48 take precedence)	21/76229	. . . . . {Concurrent filling of a plurality of trenches having a different trench shape or dimension, e.g. rectangular and V-shaped trenches, wide and narrow trenches, shallow and deep trenches}
21/74	. . . Making of {localized} buried regions, e.g. buried collector layers, internal connections {substrate contacts}	21/76232	. . . . . {of trenches having a shape other than rectangular or V-shape, e.g. rounded corners, oblique or rounded trench walls (H01L 21/76229 takes precedence)}
21/743	. . . . . {Making of internal connections, substrate contacts}	21/76235	. . . . . {trench shape altered by a local oxidation of silicon process step, e.g. trench corner rounding by LOCOS}
21/746	. . . . . {for AIII-BV integrated circuits}	21/76237	. . . . . {introducing impurities in trench side or bottom walls, e.g. for forming channel stoppers or alter isolation behavior}
21/76	. . . Making of isolation regions between components	21/7624	. . . . . {using semiconductor on insulator [SOI] technology (H01L 21/76297 takes precedence; manufacture of integrated circuits on insulating substrates H01L 21/84 ; silicon on sapphire [SOS] technology H01L 21/86)}
21/7602	. . . . . {between components manufactured in an active substrate comprising SiC compounds}	21/76243	. . . . . {using silicon implanted buried insulating layers, e.g. oxide layers, i.e. SIMOX techniques}
21/7605	. . . . . {between components manufactured in an active substrate comprising AIII BV compounds}	21/76245	. . . . . {using full isolation by porous oxide silicon, i.e. FIPOS techniques}
21/7607	. . . . . {between components manufactured in an active substrate comprising A _{II} B _{VI} compounds}	21/76248	. . . . . {using lateral overgrowth techniques, i.e. ELO techniques}
21/761	. . . . . PN junctions	21/76251	. . . . . {using bonding techniques}
21/762	. . . . . Dielectric regions {, e.g. EPIC dielectric isolation, LOCOS; Trench refilling techniques, SOI technology, use of channel stoppers}	21/76254	. . . . . {with separation/delamination along an ion implanted layer, e.g. Smart-cut, Unibond}
21/76202	. . . . . {using a local oxidation of silicon, e.g. LOCOS, SWAMI, SILO (H01L 21/76235 takes precedence; together with vertical isolation, e.g. LOCOS in a SOI substrate, H01L 21/76264)}	21/76256	. . . . . {using silicon etch back techniques, e.g. BESOI, ELTRAN}
21/76205	. . . . . {in a region being recessed from the surface, e.g. in a recess, groove, tub or trench region}	21/76259	. . . . . {with separation/delamination along a porous layer}
21/76208	. . . . . {using auxiliary pillars in the recessed region, e.g. to form LOCOS over extended areas}	21/76262	. . . . . {using selective deposition of single crystal silicon, i.e. SEG techniques}
21/7621	. . . . . {the recessed region having a shape other than rectangular, e.g. rounded or oblique shape (H01L 21/76208 takes precedence)}	21/76264	. . . . . {SOI together with lateral isolation, e.g. using local oxidation of silicon, or dielectric or polycrystalline material refilled trench or air gap isolation regions, e.g. completely isolated semiconductor islands}
21/76213	. . . . . {introducing electrical inactive or active impurities in the local oxidation region, e.g. to alter LOCOS oxide growth characteristics or for additional isolation purpose}		
21/76216	. . . . . {introducing electrical active impurities in the local oxidation region for the sole purpose of creating channel stoppers}		

21/76267	. . . . .	{ Vertical isolation by silicon implanted buried insulating layers, e.g. oxide layers, i.e. SIMOX techniques }	21/76814	. . . . .	{ post-treatment or after-treatment, e.g. cleaning or removal of oxides on underlying conductors }
21/7627	. . . . .	{ Vertical isolation by full isolation by porous oxide silicon, i.e. FIPOS techniques }	21/76816	. . . . .	{ Aspects relating to the layout of the pattern or to the size of vias or trenches (layout of the interconnections per se H01L 23/528 ; CAD of ICs G06F 30/00) }
21/76272	. . . . .	{ Vertical isolation by lateral overgrowth techniques, i.e. ELO techniques }	21/76817	. . . . .	{ using printing or stamping techniques }
21/76275	. . . . .	{ Vertical isolation by bonding techniques }	21/76819	. . . . .	{ Smoothing of the dielectric (planarisation of insulating materials per se H01L 21/31051) }
21/76278	. . . . .	{ Vertical isolation by selective deposition of single crystal silicon, i.e. SEG techniques }	21/7682	. . . . .	{ the dielectric comprising air gaps }
21/76281	. . . . .	{ Lateral isolation by selective oxidation of silicon }	21/76822	. . . . .	{ Modification of the material of dielectric layers, e.g. grading, after-treatment to improve the stability of the layers, to increase their density etc. }
21/76283	. . . . .	{ Lateral isolation by refilling of trenches with dielectric material }	21/76823	. . . . .	{ transforming an insulating layer into a conductive layer }
21/76286	. . . . .	{ Lateral isolation by refilling of trenches with polycrystalline material }	21/76825	. . . . .	{ by exposing the layer to particle radiation, e.g. ion implantation, irradiation with UV light or electrons etc. (plasma treatment H01L 21/76826) }
21/76289	. . . . .	{ Lateral isolation by air gap }	21/76826	. . . . .	{ by contacting the layer with gases, liquids or plasmas }
21/76291	. . . . .	{ Lateral isolation by field effect }	21/76828	. . . . .	{ thermal treatment }
21/76294	. . . . .	{ using selective deposition of single crystal silicon, i.e. SEG techniques }	21/76829	. . . . .	{ characterised by the formation of thin functional dielectric layers, e.g. dielectric etch-stop, barrier, capping or liner layers }
21/76297	. . . . .	{ Dielectric isolation using EPIC techniques, i.e. epitaxial passivated integrated circuit }	21/76831	. . . . .	{ in via holes or trenches, e.g. non-conductive sidewall liners }
21/763	. . . . .	Polycrystalline semiconductor regions { (H01L 21/76264 takes precedence) }	21/76832	. . . . .	{ Multiple layers }
21/764	. . . . .	Air gaps { (H01L 21/76264 takes precedence) }	21/76834	. . . . .	{ formation of thin insulating films on the sidewalls or on top of conductors (H01L 21/76831 takes precedence) }
21/765	. . . . .	by field effect { (H01L 21/76264 takes precedence) }	21/76835	. . . . .	{ Combinations of two or more different dielectric layers having a low dielectric constant (H01L 21/76832 takes precedence) }
21/768	. . . . .	Applying interconnections to be used for carrying current between separate components within a device { comprising conductors and dielectrics }	21/76837	. . . . .	{ Filling up the space between adjacent conductive structures; Gap-filling properties of dielectrics }
NOTE			21/76838	. . . . .	{ characterised by the formation and the after-treatment of the conductors (etching for patterning the conductors H01L 21/3213) }
Groups			NOTE		
H01L 21/768 - H01L 21/76898 cover multi-step processes for manufacturing interconnections. Information peculiar to single-step processes should also be classified in the corresponding group, e.g.			When the interconnect is also used as the conductor part of a conductor insulator semiconductor electrode (gate level interconnections), documents are classified in the relevant electrode manufacture groups, e.g. H01L 21/28026		
• cleaning H01L 21/02041			21/7684		
• etching H01L 21/311 , H01L 21/3213			21/76841		
• masking H01L 21/027 , H01L 21/033 , H01L 21/31144 , H01L 21/32139			21/76843		
• planarizing H01L 21/3105 , H01L 21/321			21/76844		
21/76801	. . . . .	{ characterised by the formation and the after-treatment of the dielectrics, e.g. smoothing }	21/76846		
21/76802	. . . . .	{ by forming openings in dielectrics }	21/76847		
21/76804	. . . . .	{ by forming tapered via holes }	21/76849		
21/76805	. . . . .	{ the opening being a via or contact hole penetrating the underlying conductor }			
21/76807	. . . . .	{ for dual damascene structures }			
21/76808	. . . . .	{ involving intermediate temporary filling with material }			
21/7681	. . . . .	{ involving one or more buried masks }			
21/76811	. . . . .	{ involving multiple stacked pre-patterned masks }			
21/76813	. . . . .	{ involving a partial via etch }			

21/7685	. . . . .	{the layer covering a conductive structure (H01L 21/76849 takes precedence)}	21/76888	. . . . .	{By rendering at least a portion of the conductor non conductive, e.g. oxidation}
21/76852	. . . . .	{the layer also covering the sidewalls of the conductive structure}	21/76889	. . . . .	{by forming silicides of refractory metals}
21/76853	. . . . .	{characterized by particular after-treatment steps}	21/76891	. . . . .	{by using superconducting materials}
21/76855	. . . . .	{After-treatment introducing at least one additional element into the layer}	21/76892	. . . . .	{modifying the pattern}
21/76856	. . . . .	{by treatment in plasmas or gaseous environments, e.g. nitriding a refractory metal liner}	21/76894	. . . . .	{using a laser, e.g. laser cutting, laser direct writing, laser repair}
21/76858	. . . . .	{by diffusing alloying elements}	21/76895	. . . . .	{Local interconnects; Local pads, as exemplified by patent document EP0896365}
21/76859	. . . . .	{by ion implantation}	21/76897	. . . . .	{Formation of self-aligned vias or contact plugs, i.e. involving a lithographically uncritical step (self-aligned silicidation on field effect transistors H01L 29/665)}
21/76861	. . . . .	{Post-treatment or after-treatment not introducing additional chemical elements into the layer}	21/76898	. . . . .	{formed through a semiconductor substrate}
21/76862	. . . . .	{Bombardment with particles, e.g. treatment in noble gas plasmas; UV irradiation}	21/77	. . . . .	Manufacture or treatment of devices consisting of a plurality of solid state components or integrated circuits formed in, or on, a common substrate (electrically programmable read-only memories or multistep manufacturing processes therefor H01L 27/115)
21/76864	. . . . .	{Thermal treatment}	NOTE		
21/76865	. . . . .	{Selective removal of parts of the layer (H01L 21/76844 takes precedence)}	Integration processes for the manufacture of devices of the type classified in H01L 27/14 - H01L 27/32 are not classified in this group and its sub-groups. Instead, as they are peculiar to said devices, they are classified together with the devices Multistep processes for manufacturing memory structures in general using field effect technology are covered by H01L 27/1052 ; Multistep processes for manufacturing dynamic random access memory structures are covered by H01L 27/10844 ; Multistep processes for manufacturing static random access memory structures are covered by H01L 27/11 ; Multistep processes for manufacturing read-only memory structures are covered by H01L 27/112 ; Multistep processes for manufacturing electrically programmable read-only memory structures are covered by H01L 27/115		
21/76867	. . . . .	{characterized by methods of formation other than PVD, CVD or deposition from a liquids (PVD H01L 21/2855 ; CVD H01L 21/28556 ; deposition from liquids H01L 21/288)}	2021/775	. . . . .	{comprising a plurality of TFTs on a non-semiconducting substrate, e.g. driving circuits for AMLCDs}
21/76868	. . . . .	{Forming or treating discontinuous thin films, e.g. repair, enhancement or reinforcement of discontinuous thin films}	21/78	. . . . .	with subsequent division of the substrate into plural individual devices (cutting to change the surface-physical characteristics or shape of semiconductor bodies H01L 21/304)
21/7687	. . . . .	{Thin films associated with contacts of capacitors}	21/7806	. . . . .	{involving the separation of the active layers from a substrate}
21/76871	. . . . .	{Layers specifically deposited to enhance or enable the nucleation of further layers, i.e. seed layers}	21/7813	. . . . .	{leaving a reusable substrate, e.g. epitaxial lift off}
21/76873	. . . . .	{for electroplating}	21/782	. . . . .	to produce devices, each consisting of a single circuit element (H01L 21/82 takes precedence)
21/76874	. . . . .	{for electroless plating}	21/784	. . . . .	the substrate being a semiconductor body
21/76876	. . . . .	{for deposition from the gas phase, e.g. CVD}	21/786	. . . . .	the substrate being other than a semiconductor body, e.g. insulating body
21/76877	. . . . .	{Filling of holes, grooves or trenches, e.g. vias, with conductive material}	21/82	. . . . .	to produce devices, e.g. integrated circuits, each consisting of a plurality of components
21/76879	. . . . .	{by selective deposition of conductive material in the vias, e.g. selective C.V.D. on semiconductor material, plating (plating on semiconductors in general H01L 21/288)}			
21/7688	. . . . .	{by deposition over sacrificial masking layer, e.g. lift-off (lift-off per se H01L 21/0272)}			
21/76882	. . . . .	{Reflowing or applying of pressure to better fill the contact hole}			
21/76883	. . . . .	{Post-treatment or after-treatment of the conductive material}			
21/76885	. . . . .	{By forming conductive members before deposition of protective insulating material, e.g. pillars, studs}			
21/76886	. . . . .	{Modifying permanently or temporarily the pattern or the conductivity of conductive members, e.g. formation of alloys, reduction of contact resistances}			

21/8206	{the substrate being a semiconductor, using diamond technology (H01L 21/8258 takes precedence)}	21/823462	{with a particular manufacturing method of the gate insulating layers, e.g. different gate insulating layer thicknesses, particular gate insulator materials or particular gate insulator implants}
21/8213	{the substrate being a semiconductor, using SiC technology (H01L 21/8258 takes precedence)}	21/823468	{with a particular manufacturing method of the gate sidewall spacers, e.g. double spacers, particular spacer material or shape}
21/822	the substrate being a semiconductor, using silicon technology (H01L 21/8258 takes precedence)	21/823475	{interconnection or wiring or contact manufacturing related aspects}
21/8221	{Three dimensional integrated circuits stacked in different levels}	21/823481	{isolation region manufacturing related aspects, e.g. to avoid interaction of isolation region with adjacent structure}
21/8222	Bipolar technology	21/823487	{with a particular manufacturing method of vertical transistor structures, i.e. with channel vertical to the substrate surface (with a current flow parallel to the substrate surface H01L 21/823431)}
21/8224	comprising a combination of vertical and lateral transistors	21/823493	{with a particular manufacturing method of the wells or tubs, e.g. twin tubs, high energy well implants, buried implanted layers for lateral isolation [BILLI]}
21/8226	comprising merged transistor logic or integrated injection logic	21/8236	Combination of enhancement and depletion transistors
21/8228	Complementary devices, e.g. complementary transistors	21/8238	Complementary field-effect transistors, e.g. CMOS
21/82285	{Complementary vertical transistors}	21/823807	{with a particular manufacturing method of the channel structures, e.g. channel implants, halo or pocket implants, or channel materials}
21/8229	Memory structures	21/823814	{with a particular manufacturing method of the source or drain structures, e.g. specific source or drain implants or silicided source or drain structures or raised source or drain structures}
21/8232	Field-effect technology	21/823425	{manufacturing common source or drain regions between a plurality of conductor-insulator-semiconductor structures}
21/8234	MIS technology {, i.e. integration processes of field effect transistors of the conductor-insulator-semiconductor type}	21/823431	{with a particular manufacturing method of transistors with a horizontal current flow in a vertical sidewall of a semiconductor body, e.g. FinFET, MuGFET}
21/823406	{Combination of charge coupled devices, i.e. CCD, or BBD}	21/823437	{with a particular manufacturing method of the gate conductors, e.g. particular materials, shapes}
21/823412	{with a particular manufacturing method of the channel structures, e.g. channel implants, halo or pocket implants, or channel materials}	21/823443	{silicided or silicided gate conductors}
21/823418	{with a particular manufacturing method of the source or drain structures, e.g. specific source or drain implants or silicided source or drain structures or raised source or drain structures}	21/82345	{gate conductors with different gate conductor materials or different gate conductor implants, e.g. dual gate structures}
21/823425	{manufacturing common source or drain regions between a plurality of conductor-insulator-semiconductor structures}	21/823456	{gate conductors with different shapes, lengths or dimensions}
21/823431	{with a particular manufacturing method of transistors with a horizontal current flow in a vertical sidewall of a semiconductor body, e.g. FinFET, MuGFET}		
21/823437	{with a particular manufacturing method of the gate conductors, e.g. particular materials, shapes}		
21/823443	{silicided or silicided gate conductors}		
21/82345	{gate conductors with different gate conductor materials or different gate conductor implants, e.g. dual gate structures}		
21/823456	{gate conductors with different shapes, lengths or dimensions}		
		21/823828	{with a particular manufacturing method of the gate conductors, e.g. particular materials, shapes}
		21/823835	{silicided or silicided gate conductors}
		21/823842	{gate conductors with different gate conductor materials or different gate conductor implants, e.g. dual gate structures}
		21/82385	{gate conductors with different shapes, lengths or dimensions}

21/823857	{with a particular manufacturing method of the gate insulating layers, e.g. different gate insulating layer thicknesses, particular gate insulator materials or particular gate insulator implants}	22/10	. {Measuring as part of the manufacturing process (burn-in G01R 31/2855)}
21/823864	{with a particular manufacturing method of the gate sidewall spacers, e.g. double spacers, particular spacer material or shape}	22/12	. . {for structural parameters, e.g. thickness, line width, refractive index, temperature, warp, bond strength, defects, optical inspection, electrical measurement of structural dimensions, metallurgic measurement of diffusions (electrical measurement of diffusions H01L 22/14)}
21/823871	{interconnection or wiring or contact manufacturing related aspects}	22/14	. . {for electrical parameters, e.g. resistance, deep-levels, CV, diffusions by electrical means}
21/823878	{isolation region manufacturing related aspects, e.g. to avoid interaction of isolation region with adjacent structure}	22/20	. {Sequence of activities consisting of a plurality of measurements, corrections, marking or sorting steps}
21/823885	{with a particular manufacturing method of vertical transistor structures, i.e. with channel vertical to the substrate surface (with a current flow parallel to the substrate surface H01L 21/823821)}	22/22	. . {Connection or disconnection of sub-entities or redundant parts of a device in response to a measurement (testing and repair of stores after manufacture including at wafer scale G11C 29/00 ; fuses per se H01L 23/525)}
21/823892	{with a particular manufacturing method of the wells or tubs, e.g. twin tubs, high energy well implants, buried implanted layers for lateral isolation [BILLI]}	22/24	. . {Optical enhancement of defects or not directly visible states, e.g. selective electrolytic deposition, bubbles in liquids, light emission, colour change (voltage contrast G01R 31/311)}
21/8239	Memory structures	22/26	. . {Acting in response to an ongoing measurement without interruption of processing, e.g. endpoint detection, in-situ thickness measurement (endpoint detection arrangements in CMP apparatus B24B 37/013 , in discharge apparatus H01J 37/32)}
21/8248	Combination of bipolar and field-effect technology	22/30	. {Structural arrangements specially adapted for testing or measuring during manufacture or treatment, or specially adapted for reliability measurements}
21/8249	Bipolar and MOS technology	22/32	. . {Additional lead-in metallisation on a device or substrate, e.g. additional pads or pad portions, lines in the scribe line, sacrificed conductors (arrangements for conducting electric current to or from the solid state body in operation H01L 23/48)}
21/8252	the substrate being a semiconductor, using III-V technology (H01L 21/8258 takes precedence)	22/34	. . {Circuits for electrically characterising or monitoring manufacturing processes, e. g. whole test die, wafers filled with test structures, on-board-devices incorporated on each die, process control monitors or pad structures thereof, devices in scribe line (switching, multiplexing, gating devices G01R 19/25 ; process control with lithography, e.g. dose control, G03F 7/20 ; structures for alignment control by optical means G03F 7/70633)}
21/8254	the substrate being a semiconductor, using II-VI technology (H01L 21/8258 takes precedence)		
21/8256	the substrate being a semiconductor, using technologies not covered by one of groups { H01L 21/8206 , H01L 21/8213 }, H01L 21/822 , H01L 21/8252 and H01L 21/8254 (H01L 21/8258 takes precedence)		
21/8258	the substrate being a semiconductor, using a combination of technologies covered by { H01L 21/8206 , H01L 21/8213 }, H01L 21/822 , H01L 21/8252 , H01L 21/8254 or H01L 21/8256	23/00	Details of semiconductor or other solid state devices (H01L 25/00 takes precedence ; structural arrangements for testing or measuring during manufacture or treatment, or for reliability measurements H01L 22/00; arrangements for connecting or disconnecting semiconductor or solid-state bodies, or methods related thereto H01L 24/00; finger print sensors G06V 40/12)}
21/84	the substrate being other than a semiconductor body, e.g. being an insulating body		
21/845	{including field-effect transistors with a horizontal current flow in a vertical sidewall of a semiconductor body, e.g. FinFET, MuGFET}		
21/86	the insulating body being sapphire, e.g. silicon on sapphire structure, i.e. SOS		
22/00	{Testing or measuring during manufacture or treatment; Reliability measurements, i.e. testing of parts without further processing to modify the parts as such; Structural arrangements therefor}		

NOTE

This group **does not cover**:

- details of semiconductor bodies or of electrodes of devices provided for in group [H01L 29/00](#), which details are covered by that group;
- details peculiar to devices provided for in a single main group of groups

H01L

H01L 23/00
(continued)

[H01L 31/00](#) - [H01L 51/00](#), which details are covered by those groups.

- 23/02 . Containers; Seals ([H01L 23/12](#), [H01L 23/34](#), [H01L 23/48](#), [H01L 23/552](#), {[H01L 23/66](#)} take precedence; {for memories [G11C](#)})
- 23/04 . . characterised by the shape {of the container or parts, e.g. caps, walls}
- 23/041 . . . {the container being a hollow construction having no base used as a mounting for the semiconductor body}
- 23/043 . . . the container being a hollow construction and having a conductive base as a mounting as well as a lead for the semiconductor body
- 23/045 the other leads having an insulating passage through the base
- 23/047 the other leads being parallel to the base
- 23/049 the other leads being perpendicular to the base
- 23/051 another lead being formed by a cover plate parallel to the base plate, e.g. sandwich type
- 23/053 . . . the container being a hollow construction and having an insulating {or insulated} base as a mounting for the semiconductor body
- 23/055 the leads having a passage through the base {([H01L 23/057](#) takes precedence)}
- 23/057 the leads being parallel to the base
- 23/06 . . characterised by the material of the container or its electrical properties
- 23/08 . . . the material being an electrical insulator, e.g. glass
- 23/10 . . characterised by the material or arrangement of seals between parts, e.g. between cap and base of the container or between leads and walls of the container
- 23/12 . Mountings, e.g. non-detachable insulating substrates
- 23/13 . . characterised by the shape
- 23/14 . . characterised by the material or its electrical properties {([printed circuit boards H05K 1/00](#))}
- 23/142 . . . {Metallic substrates having insulating layers}
- 23/145 . . . {Organic substrates, e.g. plastic}
- 23/147 . . . {Semiconductor insulating substrates (semiconductor conductive substrates [H01L 23/4926](#))}
- 23/15 . . . Ceramic or glass substrates {([H01L 23/142](#), [H01L 23/145](#), [H01L 23/147](#) take precedence)}
- 23/16 . Fillings or auxiliary members in containers {or encapsulations}, e.g. centering rings ([H01L 23/42](#), [H01L 23/552](#) take precedence)
- 23/18 . . Fillings characterised by the material, its physical or chemical properties, or its arrangement within the complete device

NOTE

Group [H01L 23/26](#) takes precedence over groups [H01L 23/20](#) - [H01L 23/24](#)

- 23/20 . . . gaseous at the normal operating temperature of the device
- 23/22 . . . liquid at the normal operating temperature of the device
- 23/24 . . . solid or gel at the normal operating temperature of the device {([H01L 23/3135](#) takes precedence)}

- 23/26 . . . including materials for absorbing or reacting with moisture or other undesired substances {, e.g. getters}
- 23/28 . Encapsulations, e.g. encapsulating layers, coatings, {e.g. for protection} ([H01L 23/552](#) takes precedence; {insulating layers for contacts or interconnections [H01L 23/5329](#)})
- 23/29 . . characterised by the material {, e.g. carbon (interlayer dielectrics [H01L 23/5329](#))}
- 23/291 . . . {Oxides or nitrides or carbides, e.g. ceramics, glass}
- 23/293 . . . {Organic, e.g. plastic}
- 23/295 {containing a filler ([H01L 23/296](#) takes precedence)}
- 23/296 {Organo-silicon compounds}
- 23/298 . . . {Semiconductor material, e.g. amorphous silicon}
- 23/31 . . characterised by the arrangement {or shape}
- 23/3107 . . . {the device being completely enclosed}
- 23/3114 {the device being a chip scale package, e.g. CSP}
- 23/3121 {a substrate forming part of the encapsulation}
- 23/3128 {the substrate having spherical bumps for external connection}
- 23/3135 {Double encapsulation or coating and encapsulation}
- 23/3142 {Sealing arrangements between parts, e.g. adhesion promoters}
- 23/315 {the encapsulation having a cavity}
- 23/3157 . . . {Partial encapsulation or coating (mask layer used as insulation layer [H01L 21/31](#))}
- 23/3164 {the coating being a foil}
- 23/3171 {the coating being directly applied to the semiconductor body, e.g. passivation layer ([H01L 23/3178](#) takes precedence)}
- 23/3178 {Coating or filling in grooves made in the semiconductor body}
- 23/3185 {the coating covering also the sidewalls of the semiconductor body}
- 23/3192 {Multilayer coating}
- 23/32 . Holders for supporting the complete device in operation, i.e. detachable fixtures ([H01L 23/40](#) takes precedence)
- 23/34 . Arrangements for cooling, heating, ventilating or temperature compensation {; Temperature sensing arrangements (thermal treatment apparatus [H01L 21/00](#))}
- 23/345 . . {Arrangements for heating (thermal treatment apparatus [H01L 21/00](#))}
- 23/36 . . Selection of materials, or shaping, to facilitate cooling or heating, e.g. heatsinks {([H01L 23/28](#), [H01L 23/40](#), [H01L 23/42](#), [H01L 23/44](#), [H01L 23/46](#) take precedence; heating [H01L 23/345](#))}
- 23/367 . . . Cooling facilitated by shape of device {([H01L 23/38](#), [H01L 23/40](#), [H01L 23/42](#), [H01L 23/44](#), [H01L 23/46](#) take precedence)}
- 23/3672 {Foil-like cooling fins or heat sinks (being part of lead-frames [H01L 23/49568](#))}
- 23/3675 {characterised by the shape of the housing}
- 23/3677 {Wire-like or pin-like cooling fins or heat sinks}

- 23/373 . . . Cooling facilitated by selection of materials for the device {or materials for thermal expansion adaptation, e.g. carbon}
 - 23/3731 {Ceramic materials or glass ([H01L 23/3732](#), [H01L 23/3733](#), [H01L 23/3735](#), [H01L 23/3737](#), [H01L 23/3738](#) take precedence)}
 - 23/3732 {Diamonds}
 - 23/3733 {having a heterogeneous or anisotropic structure, e.g. powder or fibres in a matrix, wire mesh, porous structures ([H01L 23/3732](#), [H01L 23/3737](#) take precedence)}
 - 23/3735 {Laminates or multilayers, e.g. direct bond copper ceramic substrates}
 - 23/3736 {Metallic materials ([H01L 23/3732](#), [H01L 23/3733](#), [H01L 23/3735](#), [H01L 23/3737](#), [H01L 23/3738](#) take precedence)}
 - 23/3737 {Organic materials with or without a thermoconductive filler}
 - 23/3738 {Semiconductor materials}
 - 23/38 . . Cooling arrangements using the Peltier effect
 - 23/40 . . Mountings or securing means for detachable cooling or heating arrangements {(heating [H01L 23/345](#)); fixed by friction, plugs or springs}
 - 23/4006 . . . {with bolts or screws}
 - 23/4012 {for stacked arrangements of a plurality of semiconductor devices ([assemblies per se](#) [H01L 25/00](#))}
 - 2023/4018 {characterised by the type of device to be heated or cooled}
 - 2023/4025 {Base discrete devices, e.g. presspack, disc-type transistors}
 - 2023/4031 {Packaged discrete devices, e.g. to-3 housings, diodes}
 - 2023/4037 {characterised by thermal path or place of attachment of heatsink}
 - 2023/4043 {heatsink to have chip}
 - 2023/405 {heatsink to package}
 - 2023/4056 {heatsink to additional heatsink}
 - 2023/4062 {heatsink to or through board or cabinet}
 - 2023/4068 {Heatconductors between device and heatsink, e.g. compliant heat-spreaders, heat-conducting bands}
 - 2023/4075 {Mechanical elements}
 - 2023/4081 {Compliant clamping elements not primarily serving heat-conduction}
 - 2023/4087 {Mounting accessories, interposers, clamping or screwing parts}
 - 23/4093 . . . {Snap-on arrangements, e.g. clips}
 - 23/42 . . Fillings or auxiliary members in containers {or encapsulations} selected or arranged to facilitate heating or cooling
 - 23/427 . . . Cooling by change of state, e.g. use of heat pipes {(by liquefied gas [H01L 23/445](#))}
 - 23/4275 {by melting or evaporation of solids}
 - 23/433 . . . Auxiliary members {in containers} characterised by their shape, e.g. pistons
 - 23/4332 {Bellows}
 - 23/4334 {Auxiliary members in encapsulations ([H01L 23/49568](#) takes precedence)}
 - 23/4336 {in combination with jet impingement}
 - 23/4338 {Pistons, e.g. spring-loaded members}
 - 23/44 . . the complete device being wholly immersed in a fluid other than air {([H01L 23/427](#) takes precedence)}
 - 23/445 . . . {the fluid being a liquefied gas, e.g. in a cryogenic vessel}
 - 23/46 . . involving the transfer of heat by flowing fluids ([H01L 23/42](#), [H01L 23/44](#) take precedence)
 - 23/467 . . . by flowing gases, e.g. air {([H01L 23/473](#) takes precedence)}
 - 23/473 . . . by flowing liquids {([H01L 23/4332](#), [H01L 23/4338](#) take precedence)}
 - 23/4735 {Jet impingement ([H01L 23/4336](#) takes precedence)}
 - 23/48 . Arrangements for conducting electric current to or from the solid state body in operation, e.g. leads, terminal arrangements {; Selection of materials therefor}
- NOTE**
- Arrangements for connecting or disconnecting semiconductor or other solid state bodies, or methods related thereto, other than those arrangements or methods covered by the following subgroups, are covered by [H01L 24/00](#)
- 23/481 . . {Internal lead connections, e.g. via connections, feedthrough structures}
 - 23/482 . . consisting of lead-in layers inseparably applied to the semiconductor body {(electrodes [H01L 29/40](#))}
 - 23/4821 . . . {Bridge structure with air gap}
 - 23/4822 . . . {Beam leads}
 - 23/4824 . . . {Pads with extended contours, e.g. grid structure, branch structure, finger structure}
 - 23/4825 . . . {for devices consisting of semiconductor layers on insulating or semi-insulating substrates, e.g. silicon on sapphire devices, i.e. SOS}
 - 23/4827 . . . {Materials}
 - 23/4828 {Conductive organic material or pastes, e.g. conductive adhesives, inks}
 - 23/485 . . . consisting of layered constructions comprising conductive layers and insulating layers, e.g. planar contacts {([H01L 23/4821](#), [H01L 23/4822](#), [H01L 23/4824](#), [H01L 23/4825](#) take precedence; materials [H01L 23/532](#), bond pads [H01L 24/02](#), bump connectors [H01L 24/10](#))}
 - 23/4855 {Overhang structure}
 - 23/488 . . consisting of soldered {or bonded} constructions {(bump connectors [H01L 24/01](#))}
 - 23/49 . . . wire-like {arrangements or pins or rods (using optical fibres [H01L 23/48](#); pins attached to insulating substrates [H01L 23/49811](#))}
 - 23/492 . . . Bases or plates {or solder therefor}
 - 23/4922 {having a heterogeneous or anisotropic structure}
 - 23/4924 {characterised by the materials}
 - 23/4926 {the materials containing semiconductor material}
 - 23/4928 {the materials containing carbon}
 - 23/495 . . . Lead-frames {or other flat leads ([H01L 23/498](#) takes precedence; lead frame interconnections between components [H01L 23/52](#))}
 - 23/49503 {characterised by the die pad}

- 23/49506 {an insulative substrate being used as a diepad, e.g. ceramic, plastic ([H01L 23/49531](#) takes precedence)}
- 23/4951 {Chip-on-leads or leads-on-chip techniques, i.e. inner lead fingers being used as die pad}
- 23/49513 {having bonding material between chip and die pad}
- 23/49517 {Additional leads}
- 23/4952 {the additional leads being a bump or a wire}
- 23/49524 {the additional leads being a tape carrier or flat leads}
- 23/49527 {the additional leads being a multilayer}
- 23/49531 {the additional leads being a wiring board}
- 23/49534 {Multi-layer}
- 23/49537 {Plurality of lead frames mounted in one device}
- 23/49541 {Geometry of the lead-frame}
- 23/49544 {Deformation absorbing parts in the lead frame plane, e.g. meanderline shape ([H01L 23/49562](#) takes precedence)}
- 23/49548 {Cross section geometry ([H01L 23/49562](#) takes precedence)}
- 23/49551 {characterised by bent parts}
- 23/49555 {the bent parts being the outer leads}
- 23/49558 {Insulating layers on lead frames, e.g. bridging members}
- 23/49562 {for devices being provided for in [H01L 29/00](#)}
- 23/49565 {Side rails of the lead frame, e.g. with perforations, sprocket holes}
- 23/49568 {specifically adapted to facilitate heat dissipation}
- 23/49572 {consisting of thin flexible metallic tape with or without a film carrier ([H01L 23/49503](#) - [H01L 23/49568](#) and [H01L 23/49575](#) - [H01L 23/49579](#) take precedence)}
- 23/49575 {Assemblies of semiconductor devices on lead frames}
- 23/49579 {characterised by the materials of the lead frames or layers thereon}
- 23/49582 {Metallic layers on lead frames}
- 23/49586 {Insulating layers on lead frames}
- 23/49589 {Capacitor integral with or on the leadframe}
- 23/49593 {Battery in combination with a leadframe}
- 23/49596 {Oscillators in combination with lead-frames}
- 23/498 Leads, {i.e. metallisations or lead-frames} on insulating substrates, {e.g. chip carriers (shape of the substrate [H01L 23/13](#))}
- 23/49805 {the leads being also applied on the sidewalls or the bottom of the substrate, e.g. leadless packages for surface mounting}
- 23/49811 {Additional leads joined to the metallisation on the insulating substrate, e.g. pins, bumps, wires, flat leads ([H01L 23/49827](#) takes precedence)}
- 23/49816 {Spherical bumps on the substrate for external connection, e.g. ball grid arrays [BGA]}
- 23/49822 {Multilayer substrates ([multilayer metallisation on monolayer substrate H01L 23/498](#))}
- 23/49827 {Via connections through the substrates, e.g. pins going through the substrate, coaxial cables ([H01L 23/49822](#), [H01L 23/49833](#), [H01L 23/4985](#), [H01L 23/49861](#) take precedence)}
- 23/49833 {the chip support structure consisting of a plurality of insulating substrates}
- 23/49838 {Geometry or layout}
- 23/49844 {for devices being provided for in [H01L 29/00](#)}
- 23/4985 {Flexible insulating substrates ([H01L 23/49572](#) and [H01L 23/49855](#) take precedence)}
- 23/49855 {for flat-cards, e.g. credit cards ([cards per se G06K 19/00](#))}
- 23/49861 {Lead-frames fixed on or encapsulated in insulating substrates ([H01L 23/4985](#), [H01L 23/49805](#) take precedence)}
- 23/49866 {characterised by the materials (materials of the substrates [H01L 23/14](#), of the lead-frames [H01L 23/49579](#))}
- 23/49872 {the conductive materials containing semiconductor material}
- 23/49877 {Carbon, e.g. fullerenes ([superconducting fullerenes H01L 39/123](#))}
- 23/49883 {the conductive materials containing organic materials or pastes, e.g. for thick films ([for printed circuits H05K 1/092](#))}
- 23/49888 {the conductive materials containing superconducting material}
- 23/49894 {Materials of the insulating layers or coatings}
- 23/50 for integrated circuit devices, {e.g. power bus, number of leads} ([H01L 23/482](#) - [H01L 23/498](#) take precedence)
- 23/52 Arrangements for conducting electric current within the device in operation from one component to another {, i.e. interconnections, e.g. wires, lead frames ([optical interconnections G02B 6/00](#))}
- 23/522 including external interconnections consisting of a multilayer structure of conductive and insulating layers inseparably formed on the semiconductor body
- 23/5221 {Crossover interconnections}
- 23/5222 {Capacitive arrangements or effects of, or between wiring layers ([other capacitive arrangements H01L 23/642](#))}
- 23/5223 {Capacitor integral with wiring layers}
- 23/5225 {Shielding layers formed together with wiring layers}
- 23/5226 {Via connections in a multilevel interconnection structure}
- 23/5227 {Inductive arrangements or effects of, or between, wiring layers ([other inductive arrangements H01L 23/645](#))}
- 23/5228 {Resistive arrangements or effects of, or between, wiring layers ([other resistive arrangements H01L 23/647](#))}
- 23/525 with adaptable interconnections
- 23/5252 {comprising anti-fuses, i.e. connections having their state changed from non-conductive to conductive}

- 23/5254 {the change of state resulting from the use of an external beam, e.g. laser beam or ion beam}
- 23/5256 {comprising fuses, i.e. connections having their state changed from conductive to non-conductive}
- 23/5258 {the change of state resulting from the use of an external beam, e.g. laser beam or ion beam}
- 23/528 . . . {Geometry or} layout of the interconnection structure {(H01L 27/0207 takes precedence; algorithms G06F 30/00)}
- 23/5283 {Cross-sectional geometry}
- 23/5286 {Arrangements of power or ground buses}
- 23/532 . . . characterised by the materials
- 23/53204 {Conductive materials}
- 23/53209 {based on metals, e.g. alloys, metal silicides (H01L 23/53285 takes precedence)}
- 23/53214 {the principal metal being aluminium}
- 23/53219 {Aluminium alloys}
- 23/53223 {Additional layers associated with aluminium layers, e.g. adhesion, barrier, cladding layers}
- 23/53228 {the principal metal being copper}
- 23/53233 {Copper alloys}
- 23/53238 {Additional layers associated with copper layers, e.g. adhesion, barrier, cladding layers}
- 23/53242 {the principal metal being a noble metal, e.g. gold}
- 23/53247 {Noble-metal alloys}
- 23/53252 {Additional layers associated with noble-metal layers, e.g. adhesion, barrier, cladding layers}
- 23/53257 {the principal metal being a refractory metal}
- 23/53261 {Refractory-metal alloys}
- 23/53266 {Additional layers associated with refractory-metal layers, e.g. adhesion, barrier, cladding layers}
- 23/53271 {containing semiconductor material, e.g. polysilicon}
- 23/53276 {containing carbon, e.g. fullerenes (superconducting fullerenes H01L 39/123)}
- 23/5328 {containing conductive organic materials or pastes, e.g. conductive adhesives, inks}
- 23/53285 {containing superconducting materials}
- 23/5329 {Insulating materials}
- 23/53295 {Stacked insulating layers}
- 23/535 . . . including internal interconnections, e.g. cross-under constructions {(internal lead connections H01L 23/481)}
- 23/538 . . . the interconnection structure between a plurality of semiconductor chips being formed on, or in, insulating substrates ({H05K takes precedence; manufacture or treatment H01L 21/4846} ; mountings per se H01L 23/12; {materials H01L 23/49866})
- 23/5381 . . . {Crossover interconnections, e.g. bridge stepovers}
- 23/5382 . . . {Adaptable interconnections, e.g. for engineering changes}
- 23/5383 . . . {Multilayer substrates (H01L 23/5385 takes precedence; multilayer metallisation on monolayer substrates H01L 23/538)}
- 23/5384 . . . {Conductive vias through the substrate with or without pins, e.g. buried coaxial conductors (H01L 23/5383, H01L 23/5385 take precedence; pins attached to insulating substrates H01L 23/49811)}
- 23/5385 . . . {Assembly of a plurality of insulating substrates}
- 23/5386 . . . {Geometry or layout of the interconnection structure}
- 23/5387 . . . {Flexible insulating substrates (H01L 23/5388 takes precedence)}
- 23/5388 . . . {for flat cards, e.g. credit cards (cards per se G06K 19/00)}
- 23/5389 . . . {the chips being integrally enclosed by the interconnect and support structures}
- 23/544 . Marks applied to semiconductor devices {or parts}, e.g. registration marks, {alignment structures, wafer maps (test patterns for characterising or monitoring manufacturing processes H01L 22/00)}
- NOTE**
- When classifying in group H01L 23/544, details are to be further indexed by using the indexing codes chosen from H01L 2223/544 and subgroups
- 23/552 . Protection against radiation, e.g. light {or electromagnetic waves}
- 23/556 . . against alpha rays
- 23/562 . {Protection against mechanical damage (H01L 23/02, H01L 23/28 take precedence)}
- 23/564 . {Details not otherwise provided for, e.g. protection against moisture (getters H01L 23/26)}
- 23/57 . {Protection from inspection, reverse engineering or tampering}
- 23/573 . . {using passive means}
- 23/576 . . {using active circuits}
- 23/58 . Structural electrical arrangements for semiconductor devices not otherwise provided for {, e.g. in combination with batteries (H01L 23/49593, H01L 23/49596 take precedence)}
- 23/585 . . {comprising conductive layers or plates or strips or rods or rings (H01L 23/60, H01L 23/62, H01L 23/64, H01L 23/66 take precedence)}
- 23/60 . . Protection against electrostatic charges or discharges, e.g. Faraday shields
- 23/62 . . Protection against overvoltage, e.g. fuses, shunts
- 23/64 . . Impedance arrangements
- 23/642 . . . {Capacitive arrangements (H01L 23/49589, H01L 23/645, H01L 23/647, H01L 23/66 take precedence; capacitive effects between wiring layers on the semiconductor body H01L 23/5222)}
- 23/645 . . . {Inductive arrangements (H01L 23/647, H01L 23/66 take precedence)}
- 23/647 . . . {Resistive arrangements (H01L 23/66, H01L 23/62 take precedence)}
- 23/66 . . . High-frequency adaptations
- NOTE**
- When classifying in group H01L 23/66, details are to be further indexed by using the

H01L

H01L 23/66
(continued)

	indexing codes chosen from H01L 2223/66 and subgroups	24/09	. . . . {of a plurality of bonding areas}
		24/10	. . {Bump connectors (bumps on insulating substrates, e.g. chip carriers, H01L 23/49816); Manufacturing methods related thereto}
24/00	{Arrangements for connecting or disconnecting semiconductor or solid-state bodies; Methods or apparatus related thereto}	24/11	. . . {Manufacturing methods (for bumps on insulating substrates H01L 21/4853)}
	NOTES	24/12	. . . {Structure, shape, material or disposition of the bump connectors prior to the connecting process}
	1. This group <u>does not cover</u> :	24/13	. . . . {of an individual bump connector}
	• details of semiconductor bodies or of electrodes of devices provided for in group H01L 29/00 , which details are covered by that group;	24/14	. . . . {of a plurality of bump connectors}
	• details peculiar to devices provided for in a single main group of groups H01L 31/00 - H01L 51/00 , which details are covered by those groups.	24/15	. . . {Structure, shape, material or disposition of the bump connectors after the connecting process}
	• printed circuits, which are covered by groups H05K 1/00 - H05K 1/189 ;	24/16	. . . . {of an individual bump connector}
	• apparatus or manufacturing processes for printed circuits, which are covered by groups H05K 3/00 - H05K 3/4685 ;	24/17	. . . . {of a plurality of bump connectors}
	• manufacture or treatment of parts, which are covered by group H01L 21/48 and subgroups except H01L 21/4885 - H01L 21/4896 ;	24/18	. . {High density interconnect [HDI] connectors; Manufacturing methods related thereto (interconnection structure between a plurality of semiconductor chips H01L 23/5389)}
	• assemblies of semiconductor devices, which are covered by groups H01L 21/50 - H01L 21/568 ;	24/19	. . . {Manufacturing methods of high density interconnect preforms}
	• applying interconnections to be used for carrying current between separate components within a device, which is covered by group H01L 21/768 and subgroups;	24/20	. . . {Structure, shape, material or disposition of high density interconnect preforms}
	• containers or seals, which are covered by groups H01L 23/02 - H01L 23/10 ;	24/23	. . . {Structure, shape, material or disposition of the high density interconnect connectors after the connecting process}
	• mountings, which are covered by groups H01L 23/12 - H01L 23/15 and subgroups;	24/24	. . . . {of an individual high density interconnect connector}
	• arrangements for cooling, heating, ventilating or temperature compensation, which are covered by groups H01L 23/34 - H01L 23/4735 ;	24/25	. . . . {of a plurality of high density interconnect connectors}
	• arrangements for conducting electric current, which are covered by groups H01L 23/48 - H01L 23/50 , and by groups H01L 23/52 - H01L 23/5389 ;	24/26	. . {Layer connectors, e.g. plate connectors, solder or adhesive layers; Manufacturing methods related thereto}
	• structural electrical arrangements, which are covered by groups H01L 24/80 - H01L 23/66 ;	24/27	. . . {Manufacturing methods}
	• assemblies of semiconductor or other solid state devices, which are covered by groups H01L 25/00 - H01L 25/18 .	24/28	. . . {Structure, shape, material or disposition of the layer connectors prior to the connecting process}
	2. In this group the following indexing codes are used : H01L 24/00 , H01L 2224/00 , H01L 2924/00 , and subgroups thereof	24/29	. . . . {of an individual layer connector}
		24/30	. . . . {of a plurality of layer connectors}
		24/31	. . . {Structure, shape, material or disposition of the layer connectors after the connecting process}
		24/32	. . . . {of an individual layer connector}
		24/33	. . . . {of a plurality of layer connectors}
		24/34	. . {Strap connectors, e.g. copper straps for grounding power devices; Manufacturing methods related thereto}
		24/35	. . . {Manufacturing methods}
		24/36	. . . {Structure, shape, material or disposition of the strap connectors prior to the connecting process}
24/01	. {Means for bonding being attached to, or being formed on, the surface to be connected, e.g. chip-to-package, die-attach, "first-level" interconnects; Manufacturing methods related thereto}	24/37	. . . . {of an individual strap connector}
		24/38	. . . . {of a plurality of strap connectors}
24/02	. . {Bonding areas (on insulating substrates, e.g. chip carriers, H01L 23/49816 , H01L 23/49838 , H01L 23/5389); Manufacturing methods related thereto}	24/39	. . . {Structure, shape, material or disposition of the strap connectors after the connecting process}
		24/40	. . . . {of an individual strap connector}
24/03	. . . {Manufacturing methods}	24/41	. . . . {of a plurality of strap connectors}
24/04	. . . {Structure, shape, material or disposition of the bonding areas prior to the connecting process}	24/42	. . {Wire connectors; Manufacturing methods related thereto}
		24/43	. . . {Manufacturing methods}
24/05	. . . . {of an individual bonding area}	24/44	. . . {Structure, shape, material or disposition of the wire connectors prior to the connecting process}
24/06	. . . . {of a plurality of bonding areas}		
24/07	. . . {Structure, shape, material or disposition of the bonding areas after the connecting process}	24/45	. . . . {of an individual wire connector}
24/08	. . . . {of an individual bonding area}	24/46	. . . . {of a plurality of wire connectors}

- 24/47 . . . {Structure, shape, material or disposition of the wire connectors after the connecting process}
- 24/48 {of an individual wire connector}
- 24/49 {of a plurality of wire connectors}
- 24/50 . . {Tape automated bonding [TAB] connectors, i.e. film carriers; Manufacturing methods related thereto (thin flexible metallic tape with or without a film carrier [H01L 23/49572](#), flexible insulating substrates [H01L 23/4985](#), [H01L 23/5387](#))}
- 24/63 . . {Connectors not provided for in any of the groups [H01L 24/10](#) - [H01L 24/50](#) and subgroups; Manufacturing methods related thereto}
- 24/64 . . . {Manufacturing methods}
- 24/65 . . . {Structure, shape, material or disposition of the connectors prior to the connecting process}
- 24/66 {of an individual connector}
- 24/67 {of a plurality of connectors}
- 24/68 . . . {Structure, shape, material or disposition of the connectors after the connecting process}
- 24/69 {of an individual connector}
- 24/70 {of a plurality of connectors}
- 24/71 . {Means for bonding not being attached to, or not being formed on, the surface to be connected (holders for supporting the complete device in operation [H01L 23/32](#))}
- 24/72 . . {Detachable connecting means consisting of mechanical auxiliary parts connecting the device, e.g. pressure contacts using springs or clips}
- 24/73 . {Means for bonding being of different types provided for in two or more of groups [H01L 24/10](#), [H01L 24/18](#), [H01L 24/26](#), [H01L 24/34](#), [H01L 24/42](#), [H01L 24/50](#), [H01L 24/63](#), [H01L 24/71](#)}
- 24/74 . {Apparatus for manufacturing arrangements for connecting or disconnecting semiconductor or solid-state bodies}
- 24/741 . . {Apparatus for manufacturing means for bonding, e.g. connectors}
- 24/742 . . . {Apparatus for manufacturing bump connectors}
- 24/743 . . . {Apparatus for manufacturing layer connectors}
- 24/744 . . . {Apparatus for manufacturing strap connectors}
- 24/745 . . . {Apparatus for manufacturing wire connectors}
- 24/75 . . {Apparatus for connecting with bump connectors or layer connectors}
- 24/76 . . {Apparatus for connecting with build-up interconnects}
- 24/77 . . {Apparatus for connecting with strap connectors}
- 24/78 . . {Apparatus for connecting with wire connectors}
- 24/79 . . {Apparatus for Tape Automated Bonding [TAB]}
- 24/799 . . {Apparatus for disconnecting}
- 24/80 . {Methods for connecting semiconductor or other solid state bodies using means for bonding being attached to, or being formed on, the surface to be connected}
- 24/81 . . {using a bump connector}
- 24/82 . . {by forming build-up interconnects at chip-level, e.g. for high density interconnects [HDI] (interconnection structure between a plurality of semiconductor chips [H01L 23/5389](#))}
- 24/83 . . {using a layer connector}
- 24/84 . . {using a strap connector}
- 24/85 . . {using a wire connector ([wire bonding in general B23K 20/004](#))}
- 24/86 . . {using tape automated bonding [TAB]}
- 24/89 . . {using at least one connector not provided for in any of the groups [H01L 24/81](#) - [H01L 24/86](#)}
- 24/90 . {Methods for connecting semiconductor or solid state bodies using means for bonding not being attached to, or not being formed on, the body surface to be connected, e.g. pressure contacts using springs or clips}
- 24/91 . {Methods for connecting semiconductor or solid state bodies including different methods provided for in two or more of groups [H01L 24/80](#) - [H01L 24/90](#)}
- 24/92 . . {Specific sequence of method steps}
- 24/93 . {Batch processes}
- 24/94 . . {at wafer-level, i.e. with connecting carried out on a wafer comprising a plurality of undiced individual devices}
- 24/95 . . {at chip-level, i.e. with connecting carried out on a plurality of singulated devices, i.e. on diced chips}
- 24/96 . . . {the devices being encapsulated in a common layer, e.g. neo-wafer or pseudo-wafer, said common layer being separable into individual assemblies after connecting}
- 24/97 . . . {the devices being connected to a common substrate, e.g. interposer, said common substrate being separable into individual assemblies after connecting}
- 24/98 . {Methods for disconnecting semiconductor or solid-state bodies}
- 25/00 Assemblies consisting of a plurality of individual semiconductor or other solid state devices (; Multistep manufacturing processes thereof)(devices consisting of a plurality of solid state components formed in or on a common substrate [H01L 27/00](#); photovoltaic modules or arrays of photovoltaic cells [H01L 31/042](#) (; panels or arrays of photo electrochemical cells [H01G 9/2068](#))}**
- 25/03 . all the devices being of a type provided for in the same subgroup of groups [H01L 27/00](#) - [H01L 51/00](#), e.g. assemblies of rectifier diodes
- 25/04 . . the devices not having separate containers
- 25/041 . . . {the devices being of a type provided for in group [H01L 31/00](#)}
- 25/042 {the devices being arranged next to each other (solar cells [H01L 31/042](#))}
- 25/043 {Stacked arrangements of devices}
- 25/046 . . . {the devices being of a type provided for in group [H01L 51/00](#)}
- 25/047 {the devices being of a type provided for in group [H01L 51/42](#), e.g. photovoltaic modules based on organic solar cells}
- 25/048 {the devices being of a type provided for in group [H01L 51/50](#), e.g. assembly of organic light emitting devices}
- 25/065 . . . the devices being of a type provided for in group [H01L 27/00](#)

NOTE

Group [H01L 25/0652](#) takes precedence over groups [H01L 25/0655](#) and [H01L 25/0657](#)

- 25/0652 {the devices being arranged next and on each other, i.e. mixed assemblies}
- 25/0655 {the devices being arranged next to each other}
- 25/0657 {Stacked arrangements of devices}
- 25/07 . . . the devices being of a type provided for in group [H01L 29/00](#)

NOTE

Group [H01L 25/071](#) takes precedence over groups [H01L 25/072](#) - [H01L 25/074](#)

- 25/071 {the devices being arranged next and on each other, i.e. mixed assemblies}
- 25/072 {the devices being arranged next to each other}
- 25/073 {Apertured devices mounted on one or more rods passed through the apertures}
- 25/074 {Stacked arrangements of non-apertured devices}
- 25/075 . . . the devices being of a type provided for in group [H01L 33/00](#)
- 25/0753 {the devices being arranged next to each other}
- 25/0756 {Stacked arrangements of devices}
- 25/10 . . the devices having separate containers
- 25/105 . . . {the devices being of a type provided for in group [H01L 27/00](#)}

NOTE

When classifying in group [H01L 25/105](#), details of the assemblies are to be further indexed by using the indexing codes chosen from [H01L 2225/1005](#) and subgroups

- 25/11 . . . the devices being of a type provided for in group [H01L 29/00](#)

NOTE

Group [H01L 25/112](#) takes precedence over groups [H01L 25/115](#) and [H01L 25/117](#)

- 25/112 {Mixed assemblies}
- 25/115 {the devices being arranged next to each other}
- 25/117 {Stacked arrangements of devices}
- 25/13 . . . the devices being of a type provided for in group [H01L 33/00](#)
- 25/16 . . the devices being of types provided for in two or more different main groups of [H01L 27/00](#) - [H01L 49/00](#) {and [H01L 51/00](#)}, e.g. forming hybrid circuits {(interconnections for hybrid circuits [H01L 23/5389](#))}
- 25/162 . . {the devices being mounted on two or more different substrates}
- 25/165 . . {Containers}
- 25/167 . . {comprising optoelectronic devices, e.g. LED, photodiodes}
- 25/18 . . the devices being of types provided for in two or more different subgroups of the same main group of groups [H01L 27/00](#) - [H01L 51/00](#) {(comprising devices provided for in [H01L 27/144](#) and subgroups, see [H01L 27/144](#) and subgroups)}

- 25/50 . . {Multistep manufacturing processes of assemblies consisting of devices, each device being of a type provided for in group [H01L 27/00](#) or [H01L 29/00](#) ([H01L 21/50](#) takes precedence)}

27/00

Devices consisting of a plurality of semiconductor or other solid-state components formed in or on a common substrate (details thereof [H01L 23/00](#), [H01L 29/00](#) - [H01L 51/00](#); assemblies consisting of a plurality of individual solid state devices [H01L 25/00](#))

NOTES

1. In this group, with the exception of groups [H01L 27/115](#) - [H01L 27/11597](#), the last place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, classification is made in the last appropriate place.
2. When classifying in this group, subject matter relating to electrically programmable read-only memories is classified in group [H01L 27/115](#), irrespective of the last place priority rule.

27/01

- . . comprising only passive thin-film or thick-film elements formed on a common insulating substrate {(passive two-terminal components without a potential-jump or surface barrier for integrated circuits, details thereof and multistep manufacturing processes therefor [H01L 28/00](#))}

NOTE

In groups [H01L 27/01](#) - [H01L 27/26](#), in the absence of an indication to the contrary, classification is made in the last appropriate place.

27/013

- . . {Thick-film circuits}

27/016

- . . {Thin-film circuits}

27/02

- . . including semiconductor components specially adapted for rectifying, oscillating, amplifying or switching and having at least one potential-jump barrier or surface barrier; including integrated passive circuit elements with at least one potential-jump barrier or surface barrier

27/0203

- . . {Particular design considerations for integrated circuits}

27/0207

- . . . {Geometrical layout of the components, e.g. computer aided design; custom LSI, semi-custom LSI, standard cell technique}

27/0211

- {adapted for requirements of temperature}

27/0214

- . . . {for internal polarisation, e.g. I2L}

27/0218

- {of field effect structures}

27/0222

- {Charge pumping, substrate bias generation structures}

27/0225

- {Charge injection in static induction transistor logic structures [SITL]}

27/0229

- {of bipolar structures}

27/0233

- {Integrated injection logic structures [I2L]}

27/0237

- {using vertical injector structures}

27/024

- {using field effect injector structures}

27/0244

- {I2L structures integrated in combination with analog structures}

27/0248

- . . . {for electrical or thermal protection, e.g. electrostatic discharge [ESD] protection}

27/0251

- {for MOS devices}

27/0255	. . . . .	{using diodes as protective elements}	27/0658	. . . . .	{Vertical bipolar transistor in combination with resistors or capacitors}
27/0259	. . . . .	{using bipolar transistors as protective elements}	27/0664	. . . . .	{Vertical bipolar transistor in combination with diodes}
27/0262	. . . . .	{including a PNP transistor and a NPN transistor, wherein each of said transistors has its base coupled to the collector of the other transistor, e.g. silicon controlled rectifier [SCR] devices}	27/067	. . . . .	{Lateral bipolar transistor in combination with diodes, or capacitors, or resistors}
27/0266	. . . . .	{using field effect transistors as protective elements}	27/0676	. . . . .	{comprising combinations of diodes, or capacitors or resistors}
27/027	. . . . .	{specially adapted to provide an electrical current path other than the field effect induced current path}	27/0682	. . . . .	{comprising combinations of capacitors and resistors}
27/0274	. . . . .	{involving a parasitic bipolar transistor triggered by the electrical biasing of the gate electrode of the field effect transistor, e.g. gate coupled transistors}	27/0688	. . . . .	{Integrated circuits having a three-dimensional layout}
27/0277	. . . . .	{involving a parasitic bipolar transistor triggered by the local electrical biasing of the layer acting as base of said parasitic bipolar transistor}	27/0694	. . . . .	{comprising components formed on opposite sides of a semiconductor substrate}
27/0281	. . . . .	{field effect transistors in a "Darlington-like" configuration}	27/07	. . . . .	the components having an active region in common
27/0285	. . . . .	{bias arrangements for gate electrode of field effect transistors, e.g. RC networks, voltage partitioning circuits (H01L 27/0281 takes precedence)}	27/0705	. . . . .	{comprising components of the field effect type}
27/0288	. . . . .	{using passive elements as protective elements, e.g. resistors, capacitors, inductors, spark-gaps}	27/0711	. . . . .	{in combination with bipolar transistors and diodes, or capacitors, or resistors}
27/0292	. . . . .	{using a specific configuration of the conducting means connecting the protective devices, e.g. ESD buses}	27/0716	. . . . .	{in combination with vertical bipolar transistors and diodes, or capacitors, or resistors}
27/0296	. . . . .	{involving a specific disposition of the protective devices}	27/0722	. . . . .	{in combination with lateral bipolar transistors and diodes, or capacitors, or resistors}
27/04	. .	the substrate being a semiconductor body	27/0727	. . . . .	{in combination with diodes, or capacitors or resistors}
27/06	. . .	including a plurality of individual components in a non-repetitive configuration	27/0733	. . . . .	{in combination with capacitors only}
27/0605	. . . . .	{integrated circuits made of compound material, e.g. $A_{III}B_V$ }	27/0738	. . . . .	{in combination with resistors only}
27/0611	. . . . .	{integrated circuits having a two-dimensional layout of components without a common active region}	27/0744	. . . . .	{without components of the field effect type}
27/0617	. . . . .	{comprising components of the field-effect type (H01L 27/0251 takes precedence)}	27/075	. . . . .	{Bipolar transistors in combination with diodes, or capacitors, or resistors, e.g. lateral bipolar transistor, and vertical bipolar transistor and resistor}
27/0623	. . . . .	{in combination with bipolar transistors}	27/0755	. . . . .	{Vertical bipolar transistor in combination with diodes, or capacitors, or resistors}
27/0629	. . . . .	{in combination with diodes, or resistors, or capacitors}	27/0761	. . . . .	{Vertical bipolar transistor in combination with diodes only}
27/0635	. . . . .	{in combination with bipolar transistors and diodes, or resistors, or capacitors}	27/0766	. . . . .	{with Schottky diodes only}
27/0641	. . . . .	{without components of the field effect type}	27/0772	. . . . .	{Vertical bipolar transistor in combination with resistors only}
27/0647	. . . . .	{Bipolar transistors in combination with diodes, or capacitors, or resistors, e.g. vertical bipolar transistor and bipolar lateral transistor and resistor}	27/0777	. . . . .	{Vertical bipolar transistor in combination with capacitors only}
27/0652	. . . . .	{Vertical bipolar transistor in combination with diodes, or capacitors, or resistors}	27/0783	. . . . .	{Lateral bipolar transistors in combination with diodes, or capacitors, or resistors}
			27/0788	. . . . .	{comprising combinations of diodes or capacitors or resistors}
			27/0794	. . . . .	{Combinations of capacitors and resistors}
			27/08	. . .	including only semiconductor components of a single kind
			27/0802	. . . . .	{Resistors only}
			27/0805	. . . . .	{Capacitors only}
			27/0808	. . . . .	{Varactor diodes}
			27/0811	. . . . .	{MIS diodes}
			27/0814	. . . . .	{Diodes only}
			27/0817	. . . . .	{Thyristors only}

27/082	. . . .	including bipolar components only	27/105	. . . .	including field-effect components
27/0821	. . . .	{Combination of lateral and vertical transistors only}	NOTE		
27/0823	. . . .	{including vertical bipolar transistors only}	In this group and its subgroups classification is made in any appropriate place		
27/0825	. . . . .	{Combination of vertical direct transistors of the same conductivity type having different characteristics, (e.g. Darlington transistors)}	27/1052	. . . . .	{Memory structures and multistep manufacturing processes therefor not provided for in groups H01L 27/1055 - H01L 27/112 }
27/0826	. . . . .	{Combination of vertical complementary transistors}	27/1055	. . . . .	{comprising charge coupled devices of the so-called bucket brigade type}
27/0828	. . . . .	{Combination of direct and inverse vertical transistors}	27/1057	. . . . .	{comprising charge coupled devices [CCD] or charge injection devices [CID]}
27/085	. . . .	including field-effect components only	27/108	. . . . .	Dynamic random access memory structures
27/088	. . . . .	the components being field-effect transistors with insulated gate	27/10802	. . . . .	{comprising floating-body transistors, e.g. floating-body cells}
27/0883	. . . . .	{Combination of depletion and enhancement field effect transistors}	27/10805	. . . . .	{with one-transistor one-capacitor memory cells}
27/0886	. . . . .	{including transistors with a horizontal current flow in a vertical sidewall of a semiconductor body, e.g. FinFET, MuGFET}	27/10808	. . . . .	{the storage electrode stacked over transistor}
27/092	. . . . .	complementary MIS field-effect transistors	27/10811	. . . . .	{with bit line higher than capacitor}
27/0921	. . . . .	{Means for preventing a bipolar, e.g. thyristor, action between the different transistor regions, e.g. Latchup prevention}	27/10814	. . . . .	{with capacitor higher than bit line level}
27/0922	. . . . .	{Combination of complementary transistors having a different structure, e.g. stacked CMOS, high-voltage and low-voltage CMOS}	27/10817	. . . . .	{the storage electrode having multiple wings}
27/0924	. . . . .	{including transistors with a horizontal current flow in a vertical sidewall of a semiconductor body, e.g. FinFET, MuGFET}	27/1082	. . . . .	{the capacitor extending under transfer transistor area}
27/0925	. . . . .	{comprising an N-well only in the substrate}	27/10823	. . . . .	{the transistor having a trench structure in the substrate}
27/0927	. . . . .	{comprising a P-well only in the substrate}	27/10826	. . . . .	{the transistor being of the FinFET type}
27/0928	. . . . .	{comprising both N- and P- wells in the substrate, e.g. twin-tub}	27/10829	. . . . .	{the capacitor being in a substrate trench}
27/095	. . . . .	the components being Schottky barrier gate field-effect transistors	27/10832	. . . . .	{the capacitor extending under or around transfer transistor area}
27/098	. . . . .	the components being PN junction gate field-effect transistors	27/10835	. . . . .	{having storage electrode extension stacked over transistor}
27/10	. . .	including a plurality of individual components in a repetitive configuration	27/10838	. . . . .	{the capacitor and the transistor being in one trench}
27/101	. . . .	{including resistors or capacitors only}	27/10841	. . . . .	{the transistor being vertical}
27/102	. . . .	including bipolar components	27/10844	. . . . .	{Multistep manufacturing methods}
27/1021	. . . . .	{including diodes only}	27/10847	. . . . .	{for structures comprising one transistor one-capacitor memory cells}
27/1022	. . . . .	{including bipolar transistors}	27/1085	. . . . .	{with at least one step of making the capacitor or connections thereto}
27/1023	. . . . .	{Bipolar dynamic random access memory structures}	27/10852	. . . . .	{the capacitor extending over the access transistor}
27/1024	. . . . .	{Arrays of single bipolar transistors only, e.g. read only memory structures}	27/10855	. . . . .	{with at least one step of making a connection between transistor and capacitor, e.g. plug}
27/1025	. . . . .	{Static bipolar memory cell structures}	27/10858	. . . . .	{the capacitor extending under the access transistor area}
27/1026	. . . . .	{Bipolar electrically programmable memory structures (using fuses H01L 23/525) }	27/10861	. . . . .	{the capacitor being in a substrate trench}
27/1027	. . . . .	{Thyristors}	27/10864	. . . . .	{in combination with a vertical transistor}
27/1028	. . . . .	{Double base diodes}			

27/10867	. . . . .	{with at least one step of making a connection between transistor and capacitor, e.g. buried strap}	27/115	. . . . .	Electrically programmable read-only memories; Multistep manufacturing processes therefor
27/1087	. . . . .	{with at least one step of making the trench}	27/11502	. . . . .	with ferroelectric memory capacitors
27/10873	. . . . .	{with at least one step of making the transistor}	27/11504	. . . . .	characterised by the top-view layout
27/10876	. . . . .	{the transistor having a trench structure in the substrate (vertical transistor in combination with a capacitor formed in a substrate trench H01L 27/10864)}	27/11507	. . . . .	characterised by the memory core region
27/10879	. . . . .	{the transistor being of the FinFET type}	27/11509	. . . . .	characterised by the peripheral circuit region
27/10882	. . . . .	{with at least one step of making a data line}	27/11512	. . . . .	characterised by the boundary region between the core and peripheral circuit regions
27/10885	. . . . .	{with at least one step of making a bit line}	27/11514	. . . . .	characterised by the three-dimensional arrangements, e.g. with cells on different height levels
27/10888	. . . . .	{with at least one step of making a bit line contact}	27/11517	. . . . .	with floating gate
27/10891	. . . . .	{with at least one step of making a word line}	27/11519	. . . . .	characterised by the top-view layout
27/10894	. . . . .	{with simultaneous manufacture of periphery and memory cells}	27/11521	. . . . .	characterised by the memory core region (three-dimensional arrangements H01L 27/11551)
27/10897	. . . . .	{Peripheral structures}	27/11524	. . . . .	with cell select transistors, e.g. NAND
27/11	. . . . .	Static random access memory structures	27/11526	. . . . .	characterised by the peripheral circuit region
27/1104	. . . . .	{the load element being a MOSFET transistor}	27/11529	. . . . .	of memory regions comprising cell select transistors, e.g. NAND
27/1108	. . . . .	{the load element being a thin film transistor}	27/11531	. . . . .	Simultaneous manufacturing of periphery and memory cells
27/1112	. . . . .	{the load element being a resistor (resistors for integrated circuits H01L 28/20 , H01L 29/8605)}	27/11534	. . . . .	including only one type of peripheral transistor
27/1116	. . . . .	{Peripheral circuit region}	27/11536	. . . . .	with a control gate layer also being used as part of the peripheral transistor
27/112	. . . . .	Read-only memory structures {[ROM] and multistep manufacturing processes therefor}	27/11539	. . . . .	with an inter-gate dielectric layer also being used as part of the peripheral transistor
27/11206	. . . . .	{Programmable ROM [PROM], e.g. memory cells comprising a transistor and a fuse or an antifuse}	27/11541	. . . . .	with a floating-gate layer also being used as part of the peripheral transistor
27/11213	. . . . .	{ROM only}	27/11543	. . . . .	with a tunnel dielectric layer also being used as part of the peripheral transistor
27/1122	. . . . .	{with source and drain on the same level, e.g. lateral transistors}	27/11546	. . . . .	including different types of peripheral transistor
27/11226	. . . . .	{Source or drain contact programmed}	27/11548	. . . . .	characterised by the boundary region between the core and peripheral circuit regions
27/11233	. . . . .	{Gate programmed, e.g. different gate material or no gate}	27/11551	. . . . .	characterised by three-dimensional arrangements, e.g. with cells on different height levels
27/1124	. . . . .	{Gate contact programmed}	27/11553	. . . . .	with source and drain on different levels, e.g. with sloping channels
27/11246	. . . . .	{Gate dielectric programmed, e.g. different thickness}	27/11556	. . . . .	the channels comprising vertical portions, e.g. U-shaped channels
27/11253	. . . . .	{Doping programmed, e.g. mask ROM}	27/11558	. . . . .	the control gate being a doped region, e.g. single-poly memory cells
27/1126	. . . . .	{Entire channel doping programmed}	27/1156	. . . . .	the floating gate being an electrode shared by two or more components
27/11266	. . . . .	{Source or drain doping programmed}			
27/11273	. . . . .	{with source and drain on different levels, e.g. vertical channel}			
27/1128	. . . . .	{with transistors on different levels, e.g. 3D ROM}			
27/11286	. . . . .	{Peripheral circuit regions}			
27/11293	. . . . .	{of memory structures of the ROM-only type}			

27/11563	. . . . .	with charge-trapping gate insulators, e.g. MNOS or NROM	2027/11838	. . . . .	{Implementation of memory functions}
27/11565	. . . . .	characterised by the top-view layout	2027/1184	. . . . .	{Implementation of analog circuits}
27/11568	. . . . .	characterised by the memory core region (three-dimensional arrangements H01L 27/11578)	2027/11842	. . . . .	{Resistors and capacitors}
27/1157	. . . . .	with cell select transistors, e.g. NAND	2027/11844	. . . . .	{Hybrid analog or digital}
27/11573	. . . . .	characterised by the peripheral circuit region	2027/11846	. . . . .	{Embedded IO cells}
27/11575	. . . . .	characterised by the boundary region between the core and peripheral circuit regions	2027/11848	. . . . .	{Transmission gate}
27/11578	. . . . .	characterised by three-dimensional arrangements, e.g. with cells on different height levels	2027/1185	. . . . .	{Porous cells, i.e. pass-through elements}
27/1158	. . . . .	with source and drain on different levels, e.g. with sloping channels	2027/11851	. . . . .	{Technology used, i.e. design rules}
27/11582	. . . . .	the channels comprising vertical portions, e.g. U-shaped channels	2027/11853	. . . . .	{Sub-micron technology}
27/11585	. . . . .	with the gate electrodes comprising a layer used for its ferroelectric memory properties, e.g. metal-ferroelectric-semiconductor [MFS] or metal-ferroelectric-metal-insulator-semiconductor [MFMS]	2027/11855	. . . . .	{Twin-tub technology}
27/11587	. . . . .	characterised by the top-view layout	2027/11857	. . . . .	{SOS, SOI technology}
27/1159	. . . . .	characterised by the memory core region	2027/11859	. . . . .	{Connectability characteristics, i.e. diffusion and polysilicon geometries}
27/11592	. . . . .	characterised by the peripheral circuit region	2027/11861	. . . . .	{Substrate and well contacts}
27/11595	. . . . .	characterised by the boundary region between core and peripheral circuit regions	2027/11862	. . . . .	{Horizontal or vertical grid line density}
27/11597	. . . . .	characterised by three-dimensional arrangements, e.g. cells on different height levels	2027/11864	. . . . .	{Yield or reliability}
27/118	. . . . .	Masterslice integrated circuits	2027/11866	. . . . .	{Gate electrode terminals or contacts}
27/11801	. . . . .	{using bipolar technology}	2027/11868	. . . . .	{Macro-architecture}
27/11803	. . . . .	{using field effect technology}	2027/1187	. . . . .	{Number of core or basic cells in the macro (RAM, ROM)}
2027/11805	. . . . .	{A3B5 or A3B6 gate arrays}	2027/11872	. . . . .	{Distribution function, e.g. Sea of Gates}
27/11807	. . . . .	{CMOS gate arrays}	2027/11874	. . . . .	{Layout specification, i.e. inner core region}
2027/11809	. . . . .	{Microarchitecture}	2027/11875	. . . . .	{Wiring region, routing}
2027/11811	. . . . .	{Basic cell P to N transistor count}	2027/11877	. . . . .	{Avoiding clock-skew or clock-delay}
2027/11812	. . . . .	{4-T CMOS basic cell}	2027/11879	. . . . .	{Data lines (buses)}
2027/11814	. . . . .	{5-T CMOS basic cell}	2027/11881	. . . . .	{Power supply lines}
2027/11816	. . . . .	{6-T CMOS basic cell}	2027/11883	. . . . .	{Levels of metallisation}
2027/11818	. . . . .	{7-T CMOS basic cell}	2027/11885	. . . . .	{Two levels of metal}
2027/1182	. . . . .	{8-T CMOS basic cell}	2027/11887	. . . . .	{Three levels of metal}
2027/11822	. . . . .	{relative P to N transistor sizes}	2027/11888	. . . . .	{More than 3 levels of metal}
2027/11824	. . . . .	{for current drive capability}	2027/1189	. . . . .	{Latch-up prevention}
2027/11825	. . . . .	{for delay time adaptation}	2027/11892	. . . . .	{Noise prevention (crosstalk)}
2027/11827	. . . . .	{for capacitive loading}	2027/11894	. . . . .	{Radiation hardened circuits}
2027/11829	. . . . .	{Isolation techniques}	27/11896	. . . . .	{using combined field effect/bipolar technology}
2027/11831	. . . . .	{FET isolation}	27/11898	. . . . .	{Input and output buffer/driver structures}
2027/11833	. . . . .	{LOCOS}	27/12	. . . . .	the substrate being other than a semiconductor body, e.g. an insulating body
2027/11835	. . . . .	{Degree of specialisation for implementing specific functions}	27/1203	. . . . .	{the substrate comprising an insulating body on a semiconductor body, e.g. SOI (three-dimensional layout H01L 27/0688)}
2027/11837	. . . . .	{Implementation of digital circuits}	27/1207	. . . . .	{combined with devices in contact with the semiconductor body, i.e. bulk/SOI hybrid circuits}
			27/1211	. . . . .	{combined with field-effect transistors with a horizontal current flow in a vertical sidewall of a semiconductor body, e.g. FinFET, MuGFET}

- 27/1214 . . . {comprising a plurality of TFTs formed on a non-semiconducting substrate, e.g. driving circuits for AMLCDs}
- WARNING**
- Group [H01L 27/1218](#) – [H01L 27/1296](#) are incomplete pending reclassification of documents from group [H01L 27/1214](#).
- Groups [H01L 27/1218](#) – [H01L 27/1296](#) and [H01L 27/1214](#) should be considered in order to perform a complete search.
- 27/1218 {with a particular composition or structure of the substrate}
- 27/1222 {with a particular composition, shape or crystalline structure of the active layer}
- 27/1225 {with semiconductor materials not belonging to the group IV of the periodic table, e.g. InGaZnO}
- 27/1229 {with different crystal properties within a device or between different devices}
- 27/1233 {with different thicknesses of the active layer in different devices}
- 27/1237 {with a different composition, shape, layout or thickness of the gate insulator in different devices}
- 27/124 {with a particular composition, shape or layout of the wiring layers specially adapted to the circuit arrangement, e.g. scanning lines in LCD pixel circuits ([wiring structures per se H01L 23/52](#))}
- 27/1244 {for preventing breakage, peeling or short circuiting}
- 27/1248 {with a particular composition or shape of the interlayer dielectric specially adapted to the circuit arrangement}
- 27/1251 {comprising TFTs having a different architecture, e.g. top- and bottom gate TFTs}
- 27/1255 {integrated with passive devices, e.g. auxiliary capacitors}
- 27/1259 {Multistep manufacturing methods}
- 27/1262 {with a particular formation, treatment or coating of the substrate}
- 27/1266 {the substrate on which the devices are formed not being the final device substrate, e.g. using a temporary substrate}
- 27/127 {with a particular formation, treatment or patterning of the active layer specially adapted to the circuit arrangement}
- 27/1274 {using crystallisation of amorphous semiconductor or recrystallisation of crystalline semiconductor}
- 27/1277 {using a crystallisation promoting species, e.g. local introduction of Ni catalyst}
- 27/1281 {by using structural features to control crystal growth, e.g. placement of grain filters}
- 27/1285 {using control of the annealing or irradiation parameters, e.g. using different scanning direction or intensity for different transistors}
- 27/1288 {employing particular masking sequences or specially adapted masks, e.g. half-tone mask}
- 27/1292 {using liquid deposition, e.g. printing}
- 27/1296 {adapted to increase the uniformity of device parameters}
- 27/13 . . . combined with thin-film or thick-film passive components
- 27/14 . . including semiconductor components sensitive to infra-red radiation, light, electromagnetic radiation of shorter wavelength or corpuscular radiation and specially adapted either for the conversion of the energy of such radiation into electrical energy or for the control of electrical energy by such radiation ([radiation-sensitive components structurally associated with one or more electric light sources only H01L 31/14](#); [couplings of light guides with optoelectronic elements G02B 6/42](#))
- 27/142 . . Energy conversion devices ([photovoltaic modules or arrays of single photovoltaic cells comprising bypass diodes integrated or directly associated with the devices H01L 31/0443](#); [photovoltaic modules composed of a plurality of thin film solar cells deposited on the same substrate H01L 31/046](#))
- 27/1421 . . . {comprising bypass diodes integrated or directly associated with the device, e.g. bypass diode integrated or formed in or on the same substrate as the solar cell}
- 27/144 . . Devices controlled by radiation
- 27/1443 . . . {with at least one potential jump or surface barrier}
- 27/1446 . . . {in a repetitive configuration}
- 27/146 . . . Imager structures
- 27/14601 {Structural or functional details thereof}
- 27/14603 {Special geometry or disposition of pixel-elements, address-lines or gate-electrodes}
- 27/14605 {Structural or functional details relating to the position of the pixel elements, e.g. smaller pixel elements in the center of the imager compared to pixel elements at the periphery}
- 27/14607 {Geometry of the photosensitive area}
- 27/14609 {Pixel-elements with integrated switching, control, storage or amplification elements ([scanning details of imagers H04N 3/15](#); [circuitry of imagers H04N 5/369](#))}
- 27/1461 {characterised by the photosensitive area}
- 27/14612 {involving a transistor}
- 27/14614 {having a special gate structure}
- 27/14616 {characterised by the channel of the transistor, e.g. channel having a doping gradient}
- 27/14618 {Containers}
- 27/1462 {Coatings}
- 27/14621 {Colour filter arrangements}
- 27/14623 {Optical shielding}
- 27/14625 {Optical elements or arrangements associated with the device}
- 27/14627 {Microlenses}
- 27/14629 {Reflectors}
- 27/1463 {Pixel isolation structures}
- 27/14632 {Wafer-level processed structures}

- 27/14634 {Assemblies, i.e. Hybrid structures}
- 27/14636 {Interconnect structures}
- 27/14638 {Structures specially adapted for transferring the charges across the imager perpendicular to the imaging plane}
- 27/1464 {Back illuminated imager structures}
- 27/14641 {Electronic components shared by two or more pixel-elements, e.g. one amplifier shared by two pixel elements}
- 27/14643 {Photodiode arrays; MOS imagers}
- 27/14645 {Colour imagers}
- 27/14647 {Multicolour imagers having a stacked pixel-element structure, e.g. npn, npnpn or MQW elements}
- 27/14649 {Infra-red imagers}
- 27/1465 {of the hybrid type}
- 27/14652 {Multispectral infra-red imagers, having a stacked pixel-element structure, e.g. npn, npnpn or MQW structures}
- 27/14654 {Blooming suppression}
- 27/14656 {Overflow drain structures}
- 27/14658 {X-ray, gamma-ray or corpuscular radiation imagers (measuring X-, gamma- or corpuscular radiation [G01T 1/00](#))}
- 27/14659 {Direct radiation imagers structures}
- 27/14661 {of the hybrid type}
- 27/14663 {Indirect radiation imagers, e.g. using luminescent members}
- 27/14665 {Imagers using a photoconductor layer}
- 27/14667 {Colour imagers}
- 27/14669 {Infra-red imagers}
- 27/1467 {of the hybrid type}
- 27/14672 {Blooming suppression}
- 27/14674 {Overflow drain structures}
- 27/14676 {X-ray, gamma-ray or corpuscular radiation imagers (measuring X-, gamma- or corpuscular radiation [G01T 1/00](#))}
- 27/14678 {Contact-type imagers}
- 27/14679 {Junction field effect transistor [JFET] imagers; static induction transistor [SIT] imagers}
- 27/14681 {Bipolar transistor imagers}
- 27/14683 {Processes or apparatus peculiar to the manufacture or treatment of these devices or parts thereof (not peculiar thereto [H01L 21/00](#))}
- 27/14685 {Process for coatings or optical elements}
- 27/14687 {Wafer level processing}
- 27/14689 {MOS based technologies}
- 27/1469 {Assemblies, i.e. hybrid integration}
- 27/14692 {Thin film technologies, e.g. amorphous, poly, micro- or nanocrystalline silicon}
- 27/14694 {The active layers comprising only $A_{III}B_V$ compounds, e.g. GaAs, InP}
- 27/14696 {The active layers comprising only $A_{II}B_{VI}$ compounds, e.g. CdS, ZnS, CdTe}
- 27/14698 {Post-treatment for the devices, e.g. annealing, impurity-gettering, shor-circuit elimination, recrystallisation}
- 27/148 Charge coupled imagers {(individual charge coupled devices [H01L 29/765](#))}
- 27/14806 {Structural or functional details thereof}
- 27/14812 {Special geometry or disposition of pixel-elements, address lines or gate-electrodes}
- 27/14818 {Optical shielding}
- 27/14825 {Linear CCD imagers}
- 27/14831 {Area CCD imagers}
- 27/14837 {Frame-interline transfer}
- 27/14843 {Interline transfer}
- 27/1485 {Frame transfer}
- 27/14856 {Time-delay and integration}
- 27/14862 {CID imagers}
- 27/14868 {CCD or CID colour imagers}
- 27/14875 {Infra-red CCD or CID imagers}
- 27/14881 {of the hybrid type}
- 27/14887 {Blooming suppression}
- 27/14893 {comprising a photoconductive layer deposited on the CCD structure}
- 27/15 including semiconductor components with at least one potential-jump barrier or surface barrier specially adapted for light emission {(monolithically integrated components including semiconductor laser components [H01S 5/026](#))}
- 27/153 {in a repetitive configuration, e.g. LED bars}
- 27/156 {two-dimensional arrays}
- 27/16 including thermoelectric components with or without a junction of dissimilar materials; including thermomagnetic components (using the Peltier effect only for cooling of semiconductor or other solid state devices [H01L 23/38](#))
- 27/18 including components exhibiting superconductivity
- 27/20 including piezo-electric components; including electrostrictive components; including magnetostrictive components
- 27/22 including components using galvano-magnetic effects, e.g. Hall effects; using similar magnetic field effects
- 27/222 {Magnetic non-volatile memory structures, e.g. MRAM}
- 27/224 {comprising two-terminal components, e.g. diodes, MIM elements}
- 27/226 {comprising multi-terminal components, e.g. transistors}
- 27/228 {of the field-effect transistor type}
- 27/24 including solid state components for rectifying, amplifying or switching without a potential-jump barrier or surface barrier, {e.g. resistance switching non-volatile memory structures}
- 27/2409 {comprising two-terminal selection components, e.g. diodes}
- 27/2418 {of the metal-insulator-metal type}
- 27/2427 {of the Ovonic threshold switching type}
- 27/2436 {comprising multi-terminal selection components, e.g. transistors}
- 27/2445 {of the bipolar type}
- 27/2454 {of the vertical channel field-effect transistor type}
- 27/2463 {Arrangements comprising multiple bistable or multistable switching components of the same type on a plane parallel to the substrate, e.g. cross-point arrays, details of the horizontal layout}
- 27/2472 {the switching components having a common active material layer}

- 27/2481 . . . {arranged in a direction perpendicular to the substrate, e.g. 3D cell arrays, details of the vertical layout}
- 27/249 . . . {the switching components being connected to a common vertical conductor}
- 27/26 . including bulk negative resistance effect components
- 27/265 . . {Gunn effect devices}
- 27/28 . including components using organic materials as the active part, or using a combination of organic materials with other materials as the active part
- 27/281 . . {Integrated circuits having a three-dimensional layout}
- 27/283 . . {comprising components of the field-effect type}
- 27/285 . . {Integrated circuits with a common active layer, e.g. cross point devices}
- 27/286 . . {with an active region comprising an inorganic semiconductor}
- 27/288 . . {Combination of organic light sensitive components with organic light emitting components, e.g. optocoupler}
- 27/30 . . with components specially adapted for sensing infra-red radiation, light, electromagnetic radiation of shorter wavelength, or corpuscular radiation; with components specially adapted for either the conversion of the energy of such radiation into electrical energy or for the control of electrical energy by such radiation {combination of organic light sensitive components with organic light emitting components, e.g. optocoupler [H01L 27/288](#)}
- 27/301 . . . {Energy conversion devices}
- 27/302 . . . {comprising multiple junctions, e.g. tandem cells}
- 27/304 . . . {in form of a fiber or a tube, e.g. photovoltaic fibers}
- 27/305 . . . {Devices controlled by radiation}
- 27/307 . . . {Imager structures}
- 27/308 . . . {Devices specially adapted for detecting X-ray radiation ([measuring X-radiation G01T 1/00](#))}
- 27/32 . . with components specially adapted for light emission, e.g. flat-panel displays using organic light-emitting diodes [OLED] {combination of organic light sensitive components with organic light emitting components, e.g. optocoupler [H01L 27/288](#)}
- 27/3202 . . . {OLEDs electrically connected in parallel}
- 27/3204 . . . {OLEDs electrically connected in series}
- 27/3206 . . . {Multi-colour light emission}
- 27/3209 . . . {using stacked OLED}
- 27/3211 . . . {using RGB sub-pixels}
- 27/3213 {using more than three sub-pixels, e.g. RGBW}
- 27/3216 {the areas of RGB sub-pixels being different}
- 27/3218 {characterised by the geometrical arrangement of the RGB sub-pixels}
- 27/322 {using colour filters or colour changing media [CCM]}
- 27/3223 . . . {combined with dummy elements, i.e. non-functional features}
- 27/3225 . . . {OLED integrated with another component ([H01L 27/3223 takes precedence](#))}
- 27/3227 {the other component being a light sensitive element, e.g. inorganic solar cell, inorganic photodiode ([H01L 27/288 takes precedence](#))}
- 27/323 {the other component being a touch screen}
- 27/3232 {the other component being a light modulating element, e.g. electrochromic element, photochromic element, liquid crystal element}
- 27/3234 {the other component being an imager structure ([H01L 27/146 takes precedence](#))}
- 27/3237 . . . {Displays not provided for in group [H01L 27/3241](#) and subgroups, e.g. segment-type displays}
- 27/3239 {Light emitting logos}
- 27/3241 . . . {Matrix-type displays}
- 27/3244 {Active matrix displays}
- 27/3246 {Pixel defining structures, e.g. banks}
- 27/3248 {Connection of the pixel electrode to the TFT}
- 27/3251 {Double substrate, i.e. with OLED and TFT on different substrates}
- 27/3253 {Electrical connection of the two substrates}
- 27/3255 {Chiplets}
- 27/3258 {Insulating layers formed between TFT elements and OLED elements}
- 27/326 {special geometry or disposition of pixel-elements}
- 27/3262 {of TFT}
- 27/3265 {of capacitor}
- 27/3267 {Dual display, i.e. having two independent displays}
- 27/3269 {Including photosensors to control luminance}
- 27/3272 {Shielding, e.g. of TFT}
- 27/3274 {including organic thin film transistors [OTFT]}
- 27/3276 {Wiring lines}
- 27/3279 {comprising structures specially adapted for lowering the resistance}
- 27/3281 {Passive matrix displays}
- 27/3283 {including banks or shadow masks}
- 27/3286 {Dual display, i.e. having two independent displays}
- 27/3288 {Wiring lines}
- 27/329 {comprising structures specially adapted for lowering the resistance}
- 27/3293 {Tiled displays}
- 28/00** {Passive two-terminal components without a potential-jump or surface barrier for integrated circuits; Details thereof; Multistep manufacturing processes therefor (testing or measuring during manufacture [H01L 22/00](#); integration methods [H01L 21/70](#); integrated circuits [H01L 27/00](#); two-terminal components with a potential-jump or surface barrier [H01L 29/00](#); resistors in general [H01C](#); inductors in general [H01F](#); capacitors in general [H01G](#))}
- 28/10 . {Inductors}
- 28/20 . {Resistors}
- 28/22 . . {with an active material comprising carbon, e.g. diamond or diamond-like carbon [DLC]}

28/24	. . {with an active material comprising a refractory, transition or noble metal, metal compound or metal alloy, e.g. silicides, oxides, nitrides}	29/02	. Semiconductor bodies {; Multistep manufacturing processes therefor}
28/26	. . {with an active material comprising an organic conducting material, e.g. conducting polymers}	29/04	. . characterised by their crystalline structure, e.g. polycrystalline, cubic or particular orientation of crystalline planes (characterised by physical imperfections H01L 29/30)
28/40	. {Capacitors}	29/045	. . . {by their particular orientation of crystalline planes}
28/55	. . {with a dielectric comprising a perovskite structure material}	29/06	. . characterised by their shape; characterised by the shapes, relative sizes, or dispositions of the semiconductor regions {; characterised by the concentration or distribution of impurities within semiconductor regions}
28/56	. . . {the dielectric comprising two or more layers, e.g. comprising buffer layers, seed layers, gradient layers}	29/0603	. . . {characterised by particular constructional design considerations, e.g. for preventing surface leakage, for controlling electric field concentration or for internal isolations regions (isolation regions between components H01L 21/76 ; design considerations for integrated circuits H01L 27/00 ; geometrical design considerations for devices H01L 29/0657)}
28/57	. . . {comprising a barrier layer to prevent diffusion of hydrogen or oxygen}	29/0607	. . . . {for preventing surface leakage or controlling electric field concentration}
28/60	. . {Electrodes}	29/0611	. . . . . {for increasing or controlling the breakdown voltage of reverse biased devices (H01L 29/0661 takes precedence)}
28/65	. . . {comprising a noble metal or a noble metal oxide, e.g. platinum (Pt), ruthenium (Ru), ruthenium dioxide (RuO ₂), iridium (Ir), iridium dioxide (IrO ₂)}	29/0615	. . . . . {by the doping profile or the shape or the arrangement of the PN junction, or with supplementary regions, e.g. junction termination extension [JTE] (LDD or drain offset regions H01L 29/7833)}
28/75	. . . {comprising two or more layers, e.g. comprising a barrier layer and a metal layer}	29/0619	. . . . . . {with a supplementary region doped oppositely to or in rectifying contact with the semiconductor containing or contacting region, e.g. guard rings with PN or Schottky junction}
28/82	. . . {with an enlarged surface, e.g. formed by texturisation}	29/0623	. . . . . . {Buried supplementary region, e.g. buried guard ring (multi-RESURF H01L 29/0634)}
28/84	. . . . {being a rough surface, e.g. using hemispherical grains}	29/0626	. . . . . . {with a localised breakdown region, e.g. built-in avalanching region (in self-protected thyristors H01L 29/7424)}
28/86	. . . . {having horizontal extensions}	29/063	. . . . . . {Reduced surface field [RESURF] pn-junction structures}
28/87	. . . . . {made by depositing layers, e.g. by depositing alternating conductive and insulating layers}	29/0634	. . . . . . {Multiple reduced surface field (multi-RESURF) structures, e.g. double RESURF, charge compensation, cool, superjunction (SJ), 3D-RESURF, composite buffer (CB) structures}
28/88	. . . . . {made by patterning layers, e.g. by etching conductive layers}	29/0638	. . . . . {for preventing surface leakage due to surface inversion layer, e.g. with channel stopper (channel stoppers in combination with isolation region for integrated circuits H01L 21/762)}
28/90	. . . . {having vertical extensions}	29/0642	. . . . {Isolation within the component, i.e. internal isolation}
28/91	. . . . . {made by depositing layers, e.g. by depositing alternating conductive and insulating layers}	29/0646	. . . . . {PN junctions}
28/92	. . . . . {made by patterning layers, e.g. by etching conductive layers}	29/0649	. . . . . {Dielectric regions, e.g. SiO ₂ regions, air gaps}
29/00	Semiconductor devices adapted for rectifying, amplifying, oscillating or switching, or capacitors or resistors with at least one potential-jump barrier or surface barrier, e.g. PN junction depletion layer or carrier concentration layer; Details of semiconductor bodies or of electrodes thereof; {Multistep manufacturing processes therefor} (H01L 31/00 - H01L 47/00, H01L 51/05 take precedence; processes or apparatus adapted for the manufacture or treatment thereof or of parts thereof H01L 21/00; details other than of semiconductor bodies or of electrodes thereof H01L 23/00; devices consisting of a plurality of solid state components formed in or on a common substrate H01L 27/00; {passive two-terminal components without a potential-jump or surface barrier for integrated circuits, details thereof and multistep manufacturing processes therefor H01L 28/00; } resistors in general H01C; capacitors in general H01G, {e.g. ceramic barrier-layer capacitors H01G 4/1272})		
	NOTE		
	In this main group, classification is made both in groups H01L 29/02 - H01L 29/51 and in groups H01L 29/66 - H01L 29/94 if both of these sets of groups are relevant.		

29/0653	. . . . . {adjoining the input or output region of a field-effect device, e.g. the source or drain region}	29/0852	. . . . . {of DMOS transistors}
29/0657	. . . . {characterised by the shape of the body}	WARNING	
29/0661	. . . . {specially adapted for altering the breakdown voltage by removing semiconductor material at, or in the neighbourhood of, a reverse biased junction, e.g. by bevelling, moat etching, depletion etching}	Groups H01L 29/0852 – H01L 29/0886 are incomplete pending reclassification of documents from group H01L 29/0847 and H01L 29/7801 .	
29/0665	. . . . {the shape of the body defining a nanostructure (nanotechnology per se B82B)}	Groups H01L 29/0852 – H01L 29/0886 and H01L 29/0847 , H01L 29/7801 should be considered in order to perform a complete search.	
29/0669	. . . . . {Nanowires or nanotubes (carbon nanotubes as material of solid-state device active part H01L 51/0048)}	29/0856	. . . . . {Source regions}
29/0673	. . . . . {oriented parallel to a substrate}	29/086	. . . . . {Impurity concentration or distribution}
29/0676	. . . . . {oriented perpendicular or at an angle to a substrate}	29/0865	. . . . . {Disposition}
29/068	. . . . . {comprising a junction}	29/0869	. . . . . {Shape (cell layout H01L 29/0696)}
29/0684	. . . {characterised by the shape, relative sizes or dispositions of the semiconductor regions or junctions between the regions}	29/0873	. . . . . {Drain regions}
29/0688	. . . . {characterised by the particular shape of a junction between semiconductor regions}	29/0878	. . . . . {Impurity concentration or distribution}
29/0692	. . . . {Surface layout}	29/0882	. . . . . {Disposition}
29/0696	. . . . . {of cellular field-effect devices, e.g. multicellular DMOS transistors or IGBTs}	29/0886	. . . . . {Shape}
29/08	. . . with semiconductor regions connected to an electrode carrying current to be rectified, amplified or switched and such electrode being part of a semiconductor device which comprises three or more electrodes	29/0891	. . . . . {of field-effect transistors with Schottky gate}
29/0804	. . . . . {Emitter regions of bipolar transistors}	29/0895	. . . . {Tunnel injectors}
29/0808	. . . . . {of lateral transistors}	29/10	. . . with semiconductor regions connected to an electrode not carrying current to be rectified, amplified or switched and such electrode being part of a semiconductor device which comprises three or more electrodes
29/0813	. . . . . {Non-interconnected multi-emitter structures}	29/1004	. . . . . {Base region of bipolar transistors}
29/0817	. . . . . {of heterojunction bipolar transistors (H01L 29/7375 takes precedence)}	29/1008	. . . . . {of lateral transistors}
29/0821	. . . . . {Collector regions of bipolar transistors}	29/1012	. . . . . {Base regions of thyristors (H01L 29/083 takes precedence)}
29/0826	. . . . . {Pedestal collectors}	29/1016	. . . . . {Anode base regions of thyristors}
29/083	. . . . . {Anode or cathode regions of thyristors or gated bipolar-mode devices}	29/102	. . . . . {Cathode base regions of thyristors}
29/0834	. . . . . {Anode regions of thyristors or gated bipolar-mode devices, e.g. supplementary regions surrounding anode regions}	29/1025	. . . . . {Channel region of field-effect devices}
29/0839	. . . . . {Cathode regions of thyristors}	29/1029	. . . . . {of field-effect transistors}
29/0843	. . . . . {Source or drain regions of field-effect devices}	29/1033	. . . . . {with insulated gate, e.g. characterised by the length, the width, the geometric contour or the doping structure (with channel and gate aligned in the lengthwise direction H01L 29/42376; with buried channel H01L 29/7838)}
29/0847	. . . . . {of field-effect transistors with insulated gate (H01L 29/0653 takes precedence ; with a passive supplementary region between source or drain and substrate related to punch-through, capacity or isolation phenomena H01L 29/1079 ; with LDD or DDD structure H01L 29/7833 ; for thin film transistors H01L 29/78618)}	29/1037	. . . . . {and non-planar channel (resulting from the gate electrode disposition, e.g. within a trench, H01L 29/42356)}
		29/1041	. . . . . {with a non-uniform doping structure in the channel region surface}
		29/1045	. . . . . {the doping structure being parallel to the channel length, e.g. DMOS like}
		29/105	. . . . . {with vertical doping variation (H01L 29/7827 takes precedence)}
		29/1054	. . . . . {with a variation of the composition, e.g. channel with strained layer for increasing the mobility}
		29/1058	. . . . . {with PN junction gate}
		29/1062	. . . . . {of charge coupled devices}
		29/1066	. . . . {Gate region of field-effect devices with PN junction gate}

- 29/107 {Substrate region of field-effect devices}
- 29/1075 {of field-effect transistors}
- 29/1079 {with insulated gate}
- 29/1083 {with an inactive supplementary region, e.g. for preventing punch-through, improving capacity effect or leakage current}
- 29/1087 {characterised by the contact structure of the substrate region, e.g. for controlling or preventing bipolar effect}
- 29/1091 {of charge coupled devices}
- 29/1095 {Body region, i.e. base region, of DMOS transistors or IGBTs (cell layout [H01L 29/0696](#))}
- 29/12 . . characterised by the materials of which they are formed
- 29/122 . . . {Single quantum well structures (single heterojunctions, couples of materials [H01L 29/165](#), [H01L 29/205](#), [H01L 29/225](#), [H01L 29/267](#))}
- 29/125 {Quantum wire structures}
- 29/127 {Quantum box structures}
- 29/15 . . . Structures with periodic or quasi periodic potential variation, e.g. multiple quantum wells, superlattices (such structures applied for the control of light [G02F 1/017](#), applied in semiconductor lasers [H01S 5/34](#))
- NOTE**
- Group [H01L 29/15](#) takes precedence over groups [H01L 29/16](#) - [H01L 29/26](#).
- 29/151 {Compositional structures ([H01L 29/157](#) and [H01L 29/158](#) take precedence)}
- 29/152 {with quantum effects only in vertical direction, i.e. layered structures with quantum effects solely resulting from vertical potential variation}
- 29/154 {comprising at least one long range structurally disordered material, e.g. one-dimensional vertical amorphous superlattices}
- 29/155 {Comprising only semiconductor materials ([H01L 29/154](#) takes precedence)}
- 29/157 {Doping structures, e.g. doping superlattices, nipi superlattices (delta doping in general [H01L 29/365](#))}
- 29/158 {Structures without potential periodicity in a direction perpendicular to a major surface of the substrate, i.e. vertical direction, e.g. lateral superlattices, lateral surface superlattices [LSS]}
- 29/16 . . . including, apart from doping materials or other impurities, only elements of Group IV of the Periodic System
- 29/1602 {Diamond}
- 29/1604 {Amorphous materials}
- 29/1606 {Graphene}
- 29/1608 {Silicon carbide}
- 29/161 including two or more of the elements provided for in group [H01L 29/16](#) {, e.g. alloys ([H01L 29/1604](#) takes precedence)}
- 29/165 in different semiconductor regions {, e.g. heterojunctions}
- 29/167 further characterised by the doping material ([H01L 29/1604](#) takes precedence)}
- 29/18 . . . Selenium or tellurium only, apart from doping materials or other impurities
- 29/185 {Amorphous materials}
- 29/20 . . . including, apart from doping materials or other impurities, only A_{III}B_V compounds
- 29/2003 {Nitride compounds}
- 29/2006 {Amorphous materials}
- 29/201 including two or more compounds {, e.g. alloys ([H01L 29/2006](#) takes precedence)}
- 29/205 in different semiconductor regions {, e.g. heterojunctions}
- 29/207 further characterised by the doping material ([H01L 29/2006](#) takes precedence)}
- 29/22 . . . including, apart from doping materials or other impurities, only A_{II}B_{VI} compounds
- 29/2203 {Cd X compounds being one element of the 6th group of the Periodic System ([H01L 29/2206](#) takes precedence)}
- 29/2206 {Amorphous materials}
- 29/221 including two or more compounds {, e.g. alloys ([H01L 29/2206](#) takes precedence)}
- 29/225 in different semiconductor regions {, e.g. heterojunctions}
- 29/227 further characterised by the doping material ([H01L 29/2206](#) takes precedence)}
- 29/24 . . . including, apart from doping materials or other impurities, only semiconductor materials not provided for in groups [H01L 29/16](#), [H01L 29/18](#), [H01L 29/20](#), [H01L 29/22](#) (including organic materials [H01L 51/00](#))
- 29/242 {A_IB_{VI} or A_IB_{VII} compounds, e.g. Cu₂O, Cu I ([H01L 29/247](#) takes precedence)}
- 29/245 {Pb compounds, e.g. PbO ([H01L 29/247](#) takes precedence)}
- 29/247 {Amorphous materials}
- 29/26 . . . including, apart from doping materials or other impurities, elements provided for in two or more of the groups [H01L 29/16](#), [H01L 29/18](#), [H01L 29/20](#), [H01L 29/22](#), [H01L 29/24](#) {, e.g. alloys}
- 29/263 {Amorphous materials}
- 29/267 in different semiconductor regions {, e.g. heterojunctions ([H01L 29/263](#) takes precedence)}
- 29/30 . . characterised by physical imperfections; having polished or roughened surface
- 29/32 . . . the imperfections being within the semiconductor body
- 29/34 . . . the imperfections being on the surface
- 29/36 . . characterised by the concentration or distribution of impurities {in the bulk material (within semiconductor regions [H01L 29/06](#))}
- 29/365 . . . {Planar doping, e.g. atomic-plane doping, delta-doping}
- 29/40 . Electrodes {; Multistep manufacturing processes therefor}
- 29/401 . . {Multistep manufacturing processes}
- 29/4011 . . . {for data storage electrodes}
- 29/40111 {the electrodes comprising a layer which is used for its ferroelectric properties}

- 29/40114 {the electrodes comprising a conductor-insulator-conductor-insulator-semiconductor structure}
- 29/40117 {the electrodes comprising a charge-trapping insulator}
- 29/402 . . {Field plates}
- 29/404 . . . {Multiple field plate structures}
- 29/405 . . . {Resistive arrangements, e.g. resistive or semi-insulating field plates}
- 29/407 . . . {Recessed field plates, e.g. trench field plates, buried field plates}
- 29/408 . . {with an insulating layer with a particular dielectric or electrostatic property, e.g. with static charges or for controlling trapped charges or moving ions, or with a plate acting on the insulator potential or the insulator charges, e.g. for controlling charges effect or potential distribution in the insulating layer, or with a semi-insulating layer contacting directly the semiconductor surface}
- 29/41 . . characterised by their shape, relative sizes or dispositions
- 29/413 . . . {Nanosized electrodes, e.g. nanowire electrodes comprising one or a plurality of nanowires (transparent electrodes comprising carbon nano-tubes [H01L 51/444](#), nanotechnology [per se B82B](#); nanosized carbon materials, e.g. carbon nanotubes, [per se C01B 32/15](#))}
- 29/417 . . . carrying the current to be rectified, amplified or switched
- 29/41708 {Emitter or collector electrodes for bipolar transistors}
- 29/41716 {Cathode or anode electrodes for thyristors}
- 29/41725 {Source or drain electrodes for field effect devices (with monocrystalline semiconductor on source/drain region [H01L 29/0843](#))}
- 29/41733 {for thin film transistors with insulated gate}
- 29/41741 {for vertical or pseudo-vertical devices}

NOTE

A pseudo-vertical device is a device with the drain and source electrodes on the same main surface and where the main current is vertical at least in a part of its path

- 29/4175 {for lateral devices where the connection to the source or drain region is done through at least one part of the semiconductor substrate thickness, e.g. with connecting sink or with via-hole}

NOTE

The sink or via-hole leading to the source or drain region is considered to form part of the source or drain electrode

- 29/41758 {for lateral devices with structured layout for source or drain region, i.e. the source or drain region having cellular, interdigitated or ring structure or being curved or angular ([H01L 29/41733](#) - [H01L 29/4175](#) take precedence)}

NOTE

Interdigitated structure means that at least one of the source or drain region has two or more fingers

- 29/41766 {with at least part of the source or drain electrode having contact below the semiconductor surface, e.g. the source or drain electrode formed at least partially in a groove or with inclusions of conductor inside the semiconductor ([H01L 29/41733](#) - [H01L 29/41758](#) take precedence)}
- 29/41775 {characterised by the proximity or the relative position of the source or drain electrode and the gate electrode, e.g. the source or drain electrode separated from the gate electrode by side-walls or spreading around or above the gate electrode}
- 29/41783 {Raised source or drain electrodes self aligned with the gate}
- 29/41791 {for transistors with a horizontal current flow in a vertical sidewall, e.g. FinFET, MuGFET}
- 29/423 . . . not carrying the current to be rectified, amplified or switched
- 29/42304 {Base electrodes for bipolar transistors}
- 29/42308 {Gate electrodes for thyristors}
- 29/42312 {Gate electrodes for field effect devices}
- 29/42316 {for field-effect transistors}
- 29/4232 {with insulated gate}
- 29/42324 {Gate electrodes for transistors with a floating gate}
- 29/42328 {with at least one additional gate other than the floating gate and the control gate, e.g. program gate, erase gate or select gate}
- 29/42332 {with the floating gate formed by two or more non connected parts, e.g. multi-particles flating gate}
- 29/42336 {with one gate at least partly formed in a trench}
- 29/4234 {Gate electrodes for transistors with charge trapping gate insulator}
- 29/42344 {with at least one additional gate, e.g. program gate, erase gate or select gate}
- 29/42348 {with trapping site formed by at least two separated sites, e.g. multi-particles trapping site}
- 29/42352 {with the gate at least partly formed in a trench}
- 29/42356 {Disposition, e.g. buried gate electrode ([H01L 29/42324](#) and [H01L 29/4234](#) take precedence)}

29/4236	. . . . .	{within a trench, e.g. trench gate electrode, groove gate electrode}	29/4941	. . . . .	{with a barrier layer between the silicon and the metal or metal silicide upper layer, e.g. Silicide/TiN/Polysilicon}
29/42364	. . . . .	{characterised by the insulating layer, e.g. thickness or uniformity (H01L 29/42324 and H01L 29/4234 take precedence)}	29/495	. . . . .	{the conductor material next to the insulator being a simple metal, e.g. W, Mo (H01L 29/4908 , H01L 29/4983 take precedence)}
29/42368	. . . . .	{the thickness being non-uniform}	29/4958	. . . . .	{with a multiple layer structure}
29/42372	. . . . .	{characterised by the conducting layer, e.g. the length, the sectional shape or the lay-out (H01L 29/42324 takes precedence)}	29/4966	. . . . .	{the conductor material next to the insulator being a composite material, e.g. organic material, TiN, MoSi ₂ (H01L 29/4908 , H01L 29/4983 take precedence)}
29/42376	. . . . .	{characterised by the length or the sectional shape}	29/4975	. . . . .	{being a silicide layer, e.g. TiSi ₂ }
29/4238	. . . . .	{characterised by the surface lay-out}	29/4983	. . . . .	{with a lateral structure, e.g. a Polysilicon gate with a lateral doping variation or with a lateral composition variation or characterised by the sidewalls being composed of conductive, resistive or dielectric material}
29/42384	. . . . .	{for thin film field effect transistors, e.g. characterised by the thickness or the shape of the insulator or the dimensions, the shape or the lay-out of the conductor}	29/4991	. . . . .	{comprising an air gap}
2029/42388	. . . . .	{characterised by the shape of the insulating material}	<u>WARNING</u>		
29/42392	. . . . .	{fully surrounding the channel, e.g. gate-all-around}	Group H01L 29/4991 is incomplete pending reclassification of documents from group H01L 29/4983 .		
29/42396	. . . . .	{for charge coupled devices}	Groups H01L 29/4991 and H01L 29/4983 should be considered in order to perform a complete search.		
29/43	. .	characterised by the materials of which they are formed	29/51	. . . . .	Insulating materials associated therewith {for MIS structures on thin film semiconductor H01L 29/4908 }
29/432	. . .	{Heterojunction gate for field effect devices}	29/511	. . . . .	{with a compositional variation, e.g. multilayer structures (H01L 29/516 takes precedence)}
29/435	. . .	{Resistive materials for field effect devices, e.g. resistive gate for MOSFET or MESFET}	29/512	. . . . .	{the variation being parallel to the channel plane}
29/437	. . .	{Superconductor materials}	29/513	. . . . .	{the variation being perpendicular to the channel plane}
29/45	. . .	Ohmic electrodes	29/515	. . . . .	{with cavities, e.g. containing a gas}
29/452	. . . . .	{on AIII-BV compounds}	29/516	. . . . .	{with at least one ferroelectric layer}
29/454	. . . . .	{on thin film AIII-BV compounds}	29/517	. . . . .	{the insulating material comprising a metallic compound, e.g. metal oxide, metal silicate (H01L 29/518 takes precedence)}
29/456	. . . . .	{on silicon}	29/518	. . . . .	{the insulating material containing nitrogen, e.g. nitride, oxynitride, nitrogen-doped material}
29/458	. . . . .	{for thin film silicon, e.g. source or drain electrode}	29/66	. .	Types of semiconductor device {; Multistep manufacturing processes therefor}
29/47	. . .	Schottky barrier electrodes {(H01L 29/435 takes precedence)}	29/66007	. .	{Multistep manufacturing processes}
29/475	. . . . .	{on AIII-BV compounds}	29/66015	. . .	{of devices having a semiconductor body comprising semiconducting carbon, e.g. diamond, diamond-like carbon, graphene}
29/49	. . .	Metal-insulator-semiconductor electrodes, {e.g. gates of MOSFET (H01L 29/435 takes precedence)}	29/66022	. . . . .	{the devices being controllable only by variation of the electric current supplied or the electric potential applied, to one or more of the electrodes carrying the current to be rectified, amplified, oscillated or switched, e.g. two-terminal devices}
<u>NOTE</u>			29/6603	. . . . .	{Diodes}
This group covers also devices using any other conductor material in place of metal			29/66037	. . . . .	{the devices being controllable only by the electric current supplied or the electric potential applied, to an electrode which does not carry the current to be rectified, amplified or switched, e.g. three-terminal devices}
29/4908	. . . . .	{for thin film semiconductor, e.g. gate of TFT}			
29/4916	. . . . .	{the conductor material next to the insulator being a silicon layer, e.g. polysilicon doped with boron, phosphorus or nitrogen (H01L 29/4908 , H01L 29/4983 take precedence)}			
29/4925	. . . . .	{with a multiple layer structure, e.g. several silicon layers with different crystal structure or grain arrangement (with only a vertical doping structure or vertical doping variation H01L 29/4916)}			
29/4933	. . . . .	{with a silicide layer contacting the silicon layer, e.g. Polycide gate (with a barrier layer between the silicide and silicon layers H01L 29/4941)}			

29/66045	. . . . .	{Field-effect transistors}	29/6625	. . . . .	{Lateral transistors (H01L 29/66242 and H01L 29/66265 take precedence)}
29/66053	. . .	{of devices having a semiconductor body comprising crystalline silicon carbide}	29/66257	. . . . .	{Schottky transistors}
29/6606	. . . . .	{the devices being controllable only by variation of the electric current supplied or the electric potential applied, to one or more of the electrodes carrying the current to be rectified, amplified, oscillated or switched, e.g. two-terminal devices}	29/66265	. . . . .	{Thin film bipolar transistors (H01L 29/66242 takes precedence)}
29/66068	. . . . .	{the devices being controllable only by the electric current supplied or the electric potential applied, to an electrode which does not carry the current to be rectified, amplified or switched, e.g. three-terminal devices}	29/66272	. . . . .	{Silicon vertical transistors (H01L 29/66242 , H01L 29/66257 and H01L 29/66265 take precedence)}
29/66075	. . .	{of devices having semiconductor bodies comprising group 14 or group 13/15 materials (comprising semiconducting carbon H01L 29/66015 ; comprising crystalline silicon carbide H01L 29/66053)}	29/6628	. . . . .	{Inverse transistors}
29/66083	. . . . .	{the devices being controllable only by variation of the electric current supplied or the electric potential applied, to one or more of the electrodes carrying the current to be rectified, amplified, oscillated or switched, e.g. two-terminal devices}	29/66287	. . . . .	{with a single crystalline emitter, collector or base including extrinsic, link or graft base formed on the silicon substrate, e.g. by epitaxy, recrystallisation, after insulating device isolation (H01L 29/6628 takes precedence)}
29/6609	. . . . .	{Diodes}	29/66295	. . . . .	{with main current going through the whole silicon substrate, e.g. power bipolar transistor}
29/66098	. . . . .	{Breakdown diodes}	29/66303	. . . . .	{with multi-emitter, e.g. interdigitated, multi-cellular or distributed emitter}
29/66106	. . . . .	{Zener diodes}	29/6631	. . . . .	{with an active layer made of a group 13/15 material}
29/66113	. . . . .	{Avalanche diodes}	29/66318	. . . . .	{Heterojunction transistors}
29/66121	. . . . .	{Multilayer diodes, e.g. PNP diodes}	29/66325	. . . . .	{controlled by field-effect, e.g. insulated gate bipolar transistors [IGBT]}
29/66128	. . . . .	{Planar diodes}	29/66333	. . . . .	{Vertical insulated gate bipolar transistors}
29/66136	. . . . .	{PN junction diodes}	29/6634	. . . . .	{with a recess formed by etching in the source/emitter contact region (H01L 29/66348 takes precedence; etching of semiconductor bodies H01L 21/302)}
29/66143	. . . . .	{Schottky diodes}	29/66348	. . . . .	{with a recessed gate}
29/66151	. . . . .	{Tunnel diodes (group 13/15 resonant tunneling diodes H01L 29/66219)}	29/66356	. . . . .	{Gated diodes, e.g. field controlled diodes [FCD], static induction thyristors [SITH], field controlled thyristors [FCTh]}
29/66159	. . . . .	{Transit time diodes, e.g. IMPATT, TRAPATT diodes}	29/66363	. . . . .	{Thyristors}
29/66166	. . . . .	{Resistors with PN junction}	29/66371	. . . . .	{structurally associated with another device, e.g. built-in diode (making integrated circuits H01L 21/82)}
29/66174	. . . . .	{Capacitors with PN or Schottky junction, e.g. varactors (capacitors with PN junction combined with MOS control H01L 29/66189)}	29/66378	. . . . .	{the other device being a controlling field-effect device}
29/66181	. . . . .	{Conductor-insulator-semiconductor capacitors, e.g. trench capacitors}	29/66386	. . . . .	{Bidirectional thyristors}
29/66189	. . . . .	{with PN junction, e.g. hybrid capacitors}	29/66393	. . . . .	{Lateral or planar thyristors}
29/66196	. . . . .	{with an active layer made of a group 13/15 material}	29/66401	. . . . .	{with an active layer made of a group 13/15 material}
29/66204	. . . . .	{Diodes}	29/66409	. . . . .	{Unipolar field-effect transistors}
29/66212	. . . . .	{Schottky diodes}	29/66416	. . . . .	{Static induction transistors [SIT] (with an active layer made of a group 13/15 material H01L 29/66454)}
29/66219	. . . . .	{with a heterojunction, e.g. resonant tunneling diodes [RTD]}	29/66424	. . . . .	{Permeable base transistors [PBT]}
29/66227	. . . . .	{the devices being controllable only by the electric current supplied or the electric potential applied, to an electrode which does not carry the current to be rectified, amplified or switched, e.g. three-terminal devices}	29/66431	. . . . .	{with a heterojunction interface channel or gate, e.g. HFET, HIGFET, SISFET, HJFET, HEMT (with an active layer made of a group 13/15 material H01L 29/66462)}
29/66234	. . . . .	{Bipolar junction transistors [BJT]}	29/66439	. . . . .	{with a one- or zero-dimensional channel, e.g. quantum wire FET, in-plane gate transistor [IPG], single electron transistor [SET], striped channel transistor, Coulomb blockade transistor (with an active layer made of a group 13/15 material H01L 29/66469)}
29/66242	. . . . .	{Heterojunction transistors [HBT] (with an active layer made of a group 13/15 material H01L 29/66318)}			

29/66446	{ with an active layer made of a group 13/15 material, e.g. group 13/15 velocity modulation transistor [VMT], group 13/15 negative resistance FET [NERFET]}	29/6659	{ with both lightly doped source and drain extensions and source and drain self-aligned to the sides of the gate, e.g. lightly doped drain [LDD] MOSFET, double diffused drain [DDD] MOSFET }
29/66454	{ Static induction transistors [SIT], e.g. permeable base transistors [PBT]}	29/66598	{ forming drain [D] and lightly doped drain [LDD] simultaneously, e.g. using implantation through the wings a T-shaped layer, or through a specially shaped layer }
29/66462	{ with a heterojunction interface channel or gate, e.g. HFET, HIGFET, SISFET, HJFET, HEMT }	29/66606	{ with final source and drain contacts formation strictly before final or dummy gate formation, e.g. contact first technology (H01L 29/66621 takes precedence) }
29/66469	{ with one- or zero-dimensional channel, e.g. quantum wire field-effect transistors, in-plane gate transistors [IPG], single electron transistors [SET], Coulomb blockade transistors, striped channel transistors }	29/66613	{ with a gate recessing step, e.g. using local oxidation (making recessed gate LDMOS transistors H01L 29/66704) }
29/66477	{ with an insulated gate, i.e. MISFET }	29/66621	{ using etching to form a recess at the gate location (etching of semiconductor bodies H01L 21/302) }
29/66484	{ with multiple gate, at least one gate being an insulated gate (H01L 29/66742 takes precedence) }	29/66628	{ recessing the gate by forming single crystalline semiconductor material at the source or drain location }
29/66492	{ with a pocket or a lightly doped drain selectively formed at the side of the gate }	29/66636	{ with source or drain recessed by etching or first recessed by etching and then refilled }
29/665	{ using self aligned silicidation, i.e. salicide (formation of conductive layers comprising silicides H01L 21/28518) }	29/66643	{ with source or drain regions formed by a Schottky barrier or a conductor-insulator-semiconductor structure }
29/66507	{ providing different silicide thicknesses on the gate and on source or drain }	29/66651	{ with a single crystalline channel formed on the silicon substrate after insulating device isolation }
29/66515	{ using self aligned selective metal deposition simultaneously on the gate and on source or drain }	29/66659	{ with asymmetry in the channel direction, e.g. lateral high-voltage MISFETs with drain offset region, extended drain MISFETs }
29/66522	{ with an active layer made of a group 13/15 material (H01L 29/66446 takes precedence) }	29/66666	{ Vertical transistors (H01L 29/66712, H01L 29/66742 take precedence) }
29/6653	{ using the removal of at least part of spacer, e.g. disposable spacer }	29/66674	{ DMOS transistors, i.e. MISFETs with a channel accommodating body or base region adjoining a drain drift region (making lateral high-voltage MISFETs with channel well and drain offset region H01L 29/66659) }
29/66537	{ using a self aligned punch through stopper or threshold implant under the gate region (H01L 29/66606 takes precedence) }	29/66681	{ Lateral DMOS transistors, i.e. LDMOS transistors }
29/66545	{ using a dummy, i.e. replacement gate in a process wherein at least a part of the final gate is self aligned to the dummy gate }	29/66689	{ with a step of forming an insulating sidewall spacer (forming insulating material on a substrate H01L 21/02107) }
29/66553	{ using inside spacers, permanent or not }	29/66696	{ with a step of recessing the source electrode }
29/6656	{ using multiple spacer layers, e.g. multiple sidewall spacers }	29/66704	{ with a step of recessing the gate electrode, e.g. to form a trench gate electrode }
29/66568	{ Lateral single gate silicon transistors }	29/66712	{ Vertical DMOS transistors, i.e. VDMOS transistors }
29/66575	{ where the source and drain or source and drain extensions are self-aligned to the sides of the gate (H01L 29/66606 takes precedence) }		
29/66583	{ with initial gate mask or masking layer complementary to the prospective gate location, e.g. with dummy source and drain contacts }		

- 29/66719 {With a step of forming an insulating sidewall spacer}
- 29/66727 {with a step of recessing the source electrode}
- 29/66734 {with a step of recessing the gate electrode, e.g. to form a trench gate electrode}
- 29/66742 {Thin film unipolar transistors}
- 29/6675 {Amorphous silicon or polysilicon transistors}
- 29/66757 {Lateral single gate single channel transistors with non-inverted structure, i.e. the channel layer is formed before the gate}
- 29/66765 {Lateral single gate single channel transistors with inverted structure, i.e. the channel layer is formed after the gate}
- 29/66772 {Monocrystalline silicon transistors on insulating substrates, e.g. quartz substrates ([H01L 29/66666 takes precedence](#); thin film FinFETs [H01L 29/66795](#))}
- 29/6678 {on sapphire substrates, e.g. SOS transistors}
- 29/66787 {with a gate at the side of the channel}
- 29/66795 {with a horizontal current flow in a vertical sidewall of a semiconductor body, e.g. FinFET, MuGFET}
- 29/66803 {with a step of doping the vertical sidewall, e.g. using tilted or multi-angled implants}
- 29/6681 {using dummy structures having essentially the same shape as the semiconductor body, e.g. to provide stability}
- 29/66818 {the channel being thinned after patterning, e.g. sacrificial oxidation on fin}
- 29/66825 {with a floating gate ([H01L 29/6684 takes precedence](#))}
- 29/66833 {with a charge trapping gate insulator, e.g. MNOS transistors}
- 29/6684 {with a ferroelectric gate insulator}
- 29/66848 {with a Schottky gate, i.e. MESFET}
- 29/66856 {with an active layer made of a group 13/15 material ([H01L 29/66446 takes precedence](#))}
- 29/66863 {Lateral single gate transistors}
- 29/66871 {Processes wherein the final gate is made after the formation of the source and drain regions in the active layer, e.g. dummy-gate processes}
- 29/66878 {Processes wherein the final gate is made before the formation, e.g. activation anneal, of the source and drain regions in the active layer}
- 29/66886 {Lateral transistors with two or more independent gates}
- 29/66893 {with a PN junction gate, i.e. JFET}
- 29/66901 {with a PN homojunction gate}
- 29/66909 {Vertical transistors, e.g. tecnetrans}
- 29/66916 {with a PN heterojunction gate}
- 29/66924 {with an active layer made of a group 13/15 material ([H01L 29/66446 takes precedence](#))}
- 29/66931 {BJT-like unipolar transistors, e.g. hot electron transistors [HET], metal base transistors [MBT], resonant tunneling transistor [RTT], bulk barrier transistor [BBT], planar doped barrier transistor [PDBT], charge injection transistor [CHINT]}
- 29/66939 {with an active layer made of a group 13/15 material}
- 29/66946 {Charge transfer devices}
- 29/66954 {with an insulated gate}
- 29/66962 {with a Schottky gate}
- 29/66969 {of devices having semiconductor bodies not comprising group 14 or group 13/15 materials (comprising selenium or tellurium in uncombined form other than as impurities in semiconductor bodies of other materials, comprising cuprous oxide or cuprous iodide [H01L 21/02365](#))}
- 29/66977 {Quantum effect devices, e.g. using quantum reflection, diffraction or interference effects, i.e. Bragg- or Aharonov-Bohm effects}
- 29/66984 {Devices using spin polarized carriers}
- 29/66992 {controllable only by the variation of applied heat ([controllable by IR radiation H01L 31/00; measuring quantity of heat G01K 17/00](#))}
- 29/68 controllable by only the electric current supplied, or only the electric potential applied, to an electrode which does not carry the current to be rectified, amplified or switched
- 29/685 {Hi-Lo semiconductor devices, e.g. memory devices}
- 29/70 Bipolar devices
- 29/705 {Double base diodes}
- 29/72 Transistor-type devices, i.e. able to continuously respond to applied control signals
- 29/73 Bipolar junction transistors
- 29/7302 {structurally associated with other devices ([assemblies of devices H01L 25/00; integrated circuits H01L 27/00; IGBT H01L 29/7393](#))}
- 29/7304 {the device being a resistive element, e.g. ballasting resistor ([transistors integrated with resistors H01L 27/075](#))}
- 29/7306 {Point contact transistors}
- 29/7308 {Schottky transistors}
- 29/7311 {Tunnel transistors}
- 29/7313 {Avalanche transistors}
- 29/7315 {Transistors with hook collector}
- 29/7317 {Bipolar thin film transistors}
- 29/732 Vertical transistors
- 29/7322 {having emitter-base and base-collector junctions leaving at the same surface of the body, e.g. planar transistor}

29/7325	. . . . .	{having an emitter-base junction leaving at a main surface and a base-collector junction leaving at a peripheral surface of the body, e.g. mesa planar transistor}	29/7404	. . . . .	{structurally associated with at least one other device (assemblies H01L 25/00 ; integrated circuits H01L 27/00)}
29/7327	. . . . .	{Inverse vertical transistors}	29/7408	. . . . .	{the device being a capacitor or a resistor}
29/735	. . . . .	Lateral transistors	29/7412	. . . . .	{the device being a diode}
29/737	. . . . .	Hetero-junction transistors	29/7416	. . . . .	{the device being an antiparallel diode, e.g. RCT (shorted anode structures enabling reverse conduction H01L 29/0834)}
29/7371	. . . . .	{Vertical transistors}	29/742	. . . . .	{the device being a field effect transistor (for turn-on or turn-off by field effect H01L 29/745 , H01L 29/749)}
29/7373	. . . . .	{having a two-dimensional base, e.g. modulation-doped base, inversion layer base, delta-doped base}	29/7424	. . . . .	{having a built-in localised breakdown/breakover region, e.g. self-protected against destructive spontaneous, e.g. voltage breakover, firing}
29/7375	. . . . .	{having an emitter comprising one or more non-monocrystalline elements of group IV, e.g. amorphous silicon, alloys comprising group IV elements}	29/7428	. . . . .	{having an amplifying gate structure, e.g. cascade (Darlington) configuration}
29/7376	. . . . .	{Resonant tunnelling transistors}	29/7432	. . . . .	{Asymmetrical thyristors (with a particular shorted anode structure H01L 29/0834)}
29/7378	. . . . .	{comprising lattice mismatched active layers, e.g. SiGe strained layer transistors}	29/7436	. . . . .	{Lateral thyristors}
29/739	. . . . .	controlled by field-effect, {e.g. bipolar static induction transistors [BSIT] (unijunction transistors H01L 29/705)}	29/744	. . . . .	Gate-turn-off devices
29/7391	. . . . .	{Gated diode structures}	29/745	. . . . .	with turn-off by field effect
29/7392	. . . . .	{with PN junction gate, e.g. field controlled thyristors (FCTh), static induction thyristors (SITh)}	29/7455	. . . . .	{produced by an insulated gate structure}
29/7393	. . . . .	{Insulated gate bipolar mode transistors, i.e. IGBT; IGT; COMFET}	29/747	. . . . .	Bidirectional devices, e.g. triacs
29/7394	. . . . .	{on an insulating layer or substrate, e.g. thin film device or device isolated from the bulk substrate (H01L 29/7398 takes precedence)}	29/749	. . . . .	with turn-on by field effect
29/7395	. . . . .	{Vertical transistors, e.g. vertical IGBT}	29/76	. . . . .	Unipolar devices {, e.g. field effect transistors}
NOTE			29/7606	. . . . .	{Transistor-like structures, e.g. hot electron transistor [HET]; metal base transistor [MBT]}
The transistor is called vertical if the emitter and the collector are not on the same main surface or, if they are on the same main surface, at least a part of the main current has a component substantially not parallel to the main surface			29/7613	. . . . .	{Single electron transistors; Coulomb blockade devices (H01L 29/7888 takes precedence)}
29/7396	. . . . .	{with a non planar surface, e.g. with a non planar gate or with a trench or recess or pillar in the surface of the emitter, base or collector region for improving current density or short circuiting the emitter and base regions (H01L 29/7398 takes precedence)}	29/762	. . . . .	Charge transfer devices
29/7397	. . . . .	{and a gate structure lying on a slanted or vertical surface or formed in a groove, e.g. trench gate IGBT}	29/765	. . . . .	Charge-coupled devices {(peripheral circuits for CCD storage devices G11C 19/285)}
29/7398	. . . . .	{with both emitter and collector contacts in the same substrate side}	29/768	. . . . .	with field effect produced by an insulated gate
29/74	. . . . .	Thyristor-type devices, e.g. having four-zone regenerative action {(two-terminal thyristors H01L 29/87)}	29/76808	. . . . .	{Input structures}
			29/76816	. . . . .	{Output structures}
			29/76825	. . . . .	{Structures for regeneration, refreshing, leakage compensation or the like}
			29/76833	. . . . .	{Buried channel CCD}
			29/76841	. . . . .	{Two-Phase CCD}
			29/7685	. . . . .	{Three-Phase CCD}
			29/76858	. . . . .	{Four-Phase CCD}
			29/76866	. . . . .	{Surface Channel CCD}
			29/76875	. . . . .	{Two-Phase CCD}
			29/76883	. . . . .	{Three-Phase CCD}
			29/76891	. . . . .	{Four-Phase CCD}
			29/772	. . . . .	Field effect transistors
			29/7722	. . . . .	{using static field induced regions, e.g. SIT, PBT}
			29/7725	. . . . .	{with delta-doped channel (H01L 29/778 takes precedence)}
			29/7727	. . . . .	{Velocity modulation transistors, i.e. VMT}
			29/775	. . . . .	with one dimensional charge carrier gas channel, e.g. quantum wire FET

29/778	. . . . .	with two-dimensional charge carrier gas channel, e.g. HEMT {; with two-dimensional charge-carrier layer formed at a heterojunction interface (H01L 29/803 takes precedence)}	29/7809	. . . . .	{having both source and drain contacts on the same surface, i.e. Up-Drain VDMOS transistors}
29/7781	. . . . .	{with inverted single heterostructure, i.e. with active layer formed on top of wide bandgap layer, e.g. IHEMT}	29/781	. . . . .	{Inverted VDMOS transistors, i.e. Source-Down VDMOS transistors}
29/7782	. . . . .	{with confinement of carriers by at least two heterojunctions, e.g. DHHEMT, quantum well HEMT, DHMODFET}	29/7811	. . . . .	{with an edge termination structure (guard regions per se H01L 29/0619 ; field plates per se H01L 29/402)}
29/7783	. . . . .	{using III-V semiconductor material}	WARNING		
29/7784	. . . . .	{with delta or planar doped donor layer (H01L 29/785 takes precedence)}	Group H01L 29/7811 is incomplete pending reclassification of documents from group H01L 29/7802 .		
29/7785	. . . . .	{with more than one donor layer}	Groups H01L 29/7811 and H01L 29/7802 should be considered in order to perform a complete search.		
29/7786	. . . . .	{with direct single heterostructure, i.e. with wide bandgap layer formed on top of active layer, e.g. direct single heterostructure MIS-like HEMT}	29/7812	. . . . .	{with a substrate comprising an insulating layer, e.g. SOI-VDMOS transistors}
29/7787	. . . . .	{with wide bandgap charge-carrier supplying layer, e.g. direct single heterostructure MODFET}	29/7813	. . . . .	{with trench gate electrode, e.g. UMOS transistors (trench gate electrodes per se H01L 29/4236)}
29/7788	. . . . .	{Vertical transistors}	29/7815	. . . . .	{with voltage or current sensing structure, e.g. emulator section, overcurrent sensing cell}
29/7789	. . . . .	{the two-dimensional charge carrier gas being at least partially not parallel to a main surface of the semiconductor body}	WARNING		
29/78	. . . . .	with field effect produced by an insulated gate {(H01L 29/7725 , H01L 29/775 , H01L 29/778 take precedence)}	Group H01L 29/7815 is incomplete pending reclassification of documents from group H01L 29/7802 .		
29/7801	. . . . .	{DMOS transistors, i.e. MISFETs with a channel accommodating body or base region adjoining a drain drift region (lateral high-voltage MISFETs with channel well and drain offset region H01L 29/7835)}	Groups H01L 29/7815 and H01L 29/7802 should be considered in order to perform a complete search.		
29/7802	. . . . .	{Vertical DMOS transistors, i.e. VDMOS transistors}	29/7816	. . . . .	{Lateral DMOS transistors, i.e. LDMOS transistors}
29/7803	. . . . .	{structurally associated with at least one other device (assemblies H01L 25/00 ; integrated circuits H01L 27/00)}	29/7817	. . . . .	{structurally associated with at least one other device (assemblies H01L 25/00 ; integrated circuits H01L 27/00)}
		WARNING	29/7818	. . . . .	{the other device being a pn-junction diode}
		Groups H01L 29/7803 – H01L 29/7808 are incomplete pending reclassification of documents from group H01L 29/7802 .	29/7819	. . . . .	{in antiparallel, e.g. freewheel diode}
		Groups H01L 29/7803 – H01L 29/7808 and H01L 29/7802 should be considered in order to perform a complete search.	29/782	. . . . .	{the other device being a Schottky barrier diode}
29/7804	. . . . .	{the other device being a pn-junction diode}	29/7821	. . . . .	{the other device being a breakdown diode, e.g. Zener diode}
29/7805	. . . . .	{in antiparallel, e.g. freewheel diode}	29/7823	. . . . .	{with an edge termination structure (guard regions per se H01L 29/0619 ; field plates per se H01L 29/402)}
29/7806	. . . . .	{the other device being a Schottky barrier diode}	29/7824	. . . . .	{with a substrate comprising an insulating layer, e.g. SOI-LDMOS transistors}
29/7808	. . . . .	{the other device being a breakdown diode, e.g. Zener diode}	29/7825	. . . . .	{with trench gate electrode (trench gate electrodes per se H01L 29/4236)}

29/7826	. . . . .	{with voltage or current sensing structure, e.g. emulator section, overcurrent sensing cell}	29/7848	. . . . .	{the means being located in the source/drain region, e.g. SiGe source and drain}
29/7827	. . . . .	{Vertical transistors (H01L 29/7802 , H01L 29/78642 take precedence)}	29/7849	. . . . .	{the means being provided under the channel}
29/7828	. . . . .	{without inversion channel, e.g. vertical ACCUFETs, normally-on vertical MISFETs}	29/785	. . . . .	{having a channel with a horizontal current flow in a vertical sidewall of a semiconductor body, e.g. FinFET, MuGFET}
29/783	. . . . .	{comprising a gate to body connection, i.e. bulk dynamic threshold voltage MOSFET (for thin film transistors H01L 29/78612 , H01L 29/78696)}	29/7851	. . . . .	{with the body tied to the substrate}
29/7831	. . . . .	{with multiple gate structure (FinFETs or MuGFETs H01L 29/7855 , thin film transistors H01L 29/78645)}	29/7853	. . . . .	{the body having a non-rectangular crosssection}
29/7832	. . . . .	{the structure comprising a MOS gate and at least one non-MOS gate, e.g. JFET or MESFET gate}	29/7854	. . . . .	{with rounded corners}
29/7833	. . . . .	{with lightly doped drain or source extension, e.g. LDD MOSFET's; DDD MOSFET's (for thin film transistors H01L 29/78618)}	29/7855	. . . . .	{with at least two independent gates}
29/7834	. . . . .	{with a non-planar structure, e.g. the gate or the source or the drain being non-planar}	29/7856	. . . . .	{with an non-uniform gate, e.g. varying doping structure, shape or composition on different sides of the fin, or different gate insulator thickness or composition on opposing fin sides (H01L 29/7855 takes precedence)}
		NOTE	2029/7857	. . . . .	{of the accumulation type}
		Field oxide sunken in the substrate and not filling a groove is not an element characterising a non-planar structure	2029/7858	. . . . .	{having contacts specially adapted to the FinFET geometry, e.g. wrap-around contacts}
29/7835	. . . . .	{with asymmetrical source and drain regions, e.g. lateral high-voltage MISFETs with drain offset region, extended drain MISFETs}	29/786	. . . . .	Thin film transistors, {i.e. transistors with a channel being at least partly a thin film (transistors having only the source or the drain region on an insulator layer H01L 29/0653 ; thin film FinFETs H01L 29/785)}
29/7836	. . . . .	{with a significant overlap between the lightly doped extension and the gate electrode (H01L 29/7834 , H01L 29/7835 take precedence)}			NOTE
29/7838	. . . . .	{without inversion channel, e.g. buried channel lateral MISFETs, normally-on lateral MISFETs, depletion-mode lateral MISFETs}			In groups H01L 29/78651 - H01L 29/78696 , the materials specified for the transistors are the material of the channel region
29/7839	. . . . .	{with Schottky drain or source contact}	29/78603	. . . . .	{characterised by the insulating substrate or support (H01L 29/78657 takes precedence)}
29/78391	. . . . .	{the gate comprising a layer which is used for its ferroelectric properties}	29/78606	. . . . .	{with supplementary region or layer in the thin film or in the insulated bulk substrate supporting it for controlling or increasing the safety of the device (H01L 29/78642 , H01L 29/78645 take precedence)}
29/7841	. . . . .	{with floating body, e.g. programmable transistors}	29/78609	. . . . .	{for preventing leakage current (H01L 29/78618 takes precedence)}
29/7842	. . . . .	{means for exerting mechanical stress on the crystal lattice of the channel region, e.g. using a flexible substrate (variation of the composition of the channel H01L 29/1054)}	29/78612	. . . . .	{for preventing the kink- or the snapback effect, e.g. discharging the minority carriers of the channel region for preventing bipolar effect}
29/7843	. . . . .	{the means being an applied insulating layer}	29/78615	. . . . .	{with a body contact}
29/7845	. . . . .	{the means being a conductive material, e.g. silicided S/D or Gate}	29/78618	. . . . .	{characterised by the drain or the source properties, e.g. the doping structure, the composition, the sectional shape or the contact structure (silicide contacts, electrodes in general H01L 29/458)}
29/7846	. . . . .	{the means being located in the lateral device isolation region, e.g. STI}			
29/7847	. . . . .	{using a memorization technique, e.g. re-crystallization under strain, bonding on a substrate having a thermal expansion coefficient different from the one of the region}			

29/78621	. . . . .	{with LDD structure or an extension or an offset region or characterised by the doping profile}	29/78696	. . . . .	{characterised by the structure of the channel, e.g. multichannel, transverse or longitudinal shape, length or width, doping structure, or the overlap or alignment between the channel and the gate, the source or the drain, or the contacting structure of the channel (H01L 29/78612 takes precedence; transistors having a drain offset region or a lightly doped drain [LDD] H01L 29/78621)}
29/78624	. . . . .	{the source and the drain regions being asymmetrical}	29/788	. . . . .	with floating gate { (H01L 29/78391 takes precedence)}
29/78627	. . . . .	{with a significant overlap between the lightly doped drain and the gate electrode, e.g. GOLDD}	29/7881	. . . . .	{Programmable transistors with only two possible levels of programming (H01L 29/7888 takes precedence)}
2029/7863	. . . . .	{with an LDD consisting of more than one lightly doped zone or having a non-homogeneous dopant distribution, e.g. graded LDD}	29/7882	. . . . .	{charging by injection of carriers through a conductive insulator, e.g. Poole-Frankel conduction}
29/78633	. . . . .	{with a light shield}	29/7883	. . . . .	{charging by tunnelling of carriers, e.g. Fowler-Nordheim tunnelling}
29/78636	. . . . .	{with supplementary region or layer for improving the flatness of the device}	29/7884	. . . . .	{charging by hot carrier injection}
29/78639	. . . . .	{with a drain or source connected to a bulk conducting substrate}	29/7885	. . . . .	{Hot carrier injection from the channel}
29/78642	. . . . .	{Vertical transistors}	29/7886	. . . . .	{Hot carrier produced by avalanche breakdown of a PN junction, e.g. FAMOS}
29/78645	. . . . .	{with multiple gate}	29/7887	. . . . .	{Programmable transistors with more than two possible different levels of programming}
29/78648	. . . . .	{arranged on opposing sides of the channel}	29/7888	. . . . .	{Transistors programmable by two single electrons}
29/78651	. . . . .	{Silicon transistors (H01L 29/78606 - H01L 29/78645 take precedence)}	29/7889	. . . . .	{Vertical transistors, i.e. transistors having source and drain not in the same horizontal plane}
29/78654	. . . . .	{Monocrystalline silicon transistors}	29/792	. . . . .	with charge trapping gate insulator, e.g. MNOS-memory transistors
29/78657	. . . . .	{SOS transistors}	29/7923	. . . . .	{Programmable transistors with more than two possible different levels of programming}
29/7866	. . . . .	{Non-monocrystalline silicon transistors}	29/7926	. . . . .	{Vertical transistors, i.e. transistors having source and drain not in the same horizontal plane}
29/78663	. . . . .	{Amorphous silicon transistors}	29/80	. . . . .	with field effect produced by a PN or other rectifying junction gate {, i.e. potential-jump barrier}
29/78666	. . . . .	{with normal-type structure, e.g. with top gate}	29/802	. . . . .	{with heterojunction gate, e.g. transistors with semiconductor layer acting as gate insulating layer, MIS-like transistors (H01L 29/806 takes precedence; with one dimensional electron gas H01L 29/775 ; with dimensional electron gas H01L 29/778)}
29/78669	. . . . .	{with inverted-type structure, e.g. with bottom gate}	29/803	. . . . .	{Programmable transistors, e.g. with charge-trapping quantum well}
29/78672	. . . . .	{Polycrystalline or microcrystalline silicon transistor}	29/806	. . . . .	{with Schottky drain or source contact}
29/78675	. . . . .	{with normal-type structure, e.g. with top gate}	29/808	. . . . .	with a PN junction gate {, e.g. PN homojunction gate (H01L 29/7725 , H01L 29/775 , H01L 29/778 , H01L 29/806 take precedence)}
29/78678	. . . . .	{with inverted-type structure, e.g. with bottom gate}	29/8083	. . . . .	{Vertical transistors (SIT H01L 29/7722)}
29/78681	. . . . .	{having a semiconductor body comprising $A_{III}B_V$ or $A_{II}B_{VI}$ or $A_{IV}B_{VI}$ semiconductor materials, or Se or Te}	29/8086	. . . . .	{Thin film JFET's}
29/78684	. . . . .	{having a semiconductor body comprising semiconductor materials of Group IV not being silicon, or alloys including an element of the group IV, e.g. Ge, SiN alloys, SiC alloys (H01L 29/7869 takes precedence)}			
29/78687	. . . . .	{with a multilayer structure or superlattice structure}			
29/7869	. . . . .	{having a semiconductor body comprising an oxide semiconductor material, e.g. zinc oxide, copper aluminium oxide, cadmium stannate}			
29/78693	. . . . .	{the semiconducting oxide being amorphous}			

- 29/812 with a Schottky gate ([H01L 29/7725](#), [H01L 29/775](#), [H01L 29/778](#), [H01L 29/806](#) take precedence; with Schottky contact on top of heterojunction gate [H01L 29/802](#))
- 29/8122 {Vertical transistors (SIT, PBT [H01L 29/7722](#))}
- 29/8124 {with multiple gate}
- 29/8126 {Thin film MESFET's}
- 29/8128 {with recessed gate}
- 29/82 controllable by variation of the magnetic field applied to the device
- 29/84 controllable by variation of applied mechanical force, e.g. of pressure
- 29/86 controllable only by variation of the electric current supplied, or only the electric potential applied, to one or more of the electrodes carrying the current to be rectified, amplified, oscillated or switched
- 29/8605 Resistors with PN junctions
- 29/861 Diodes
- 29/8611 {Planar PN junction diodes}
- 29/8613 {Mesa PN junction diodes}
- 29/8615 {Hi-lo semiconductor devices, e.g. memory devices}
- 29/8616 {Charge trapping diodes}
- 29/8618 {Diodes with bulk potential barrier, e.g. Camel diodes, Planar Doped Barrier diodes, Graded bandgap diodes}
- 29/862 Point contact diodes
- 29/864 Transit-time diodes, e.g. IMPATT, TRAPATT diodes
- 29/866 Zener diodes
- 29/868 PIN diodes
- 29/87 Thyristor diodes, e.g. Shockley diodes, break-over diodes
- 29/872 Schottky diodes
- 29/8725 {of the trench MOS barrier type [TMBS]}
- 29/88 Tunnel-effect diodes
- 29/882 {Resonant tunneling diodes, i.e. RTD, RTBD}
- 29/885 Esaki diodes
- 29/92 Capacitors with potential-jump barrier or surface barrier
- 29/93 Variable capacitance diodes, e.g. varactors
- 29/94 Metal-insulator-semiconductors, e.g. MOS
- 29/945 {Trench capacitors}
- 31/00** **Semiconductor devices sensitive to infra-red radiation, light, electromagnetic radiation of shorter wavelength or corpuscular radiation and specially adapted either for the conversion of the energy of such radiation into electrical energy or for the control of electrical energy by such radiation; Processes or apparatus specially adapted for the manufacture or treatment thereof or of parts thereof; Details thereof ([H01L 51/42](#) takes precedence; devices consisting of a plurality of solid state components formed in, or on, a common substrate, other than combinations of radiation-sensitive components with one or more electric light sources, [H01L 27/00](#))**
- 31/02 Details
- 31/02002 . . . {Arrangements for conducting electric current to or from the device in operations}
- 31/02005 . . . {for device characterised by at least one potential jump barrier or surface barrier}
- 31/02008 {for solar cells or solar cell modules}
- 31/0201 {comprising specially adapted module bus-bar structures}
- 31/02013 {comprising output lead wires elements}
- 31/02016 . . . {Circuit arrangements of general character for the devices}
- 31/02019 . . . {for devices characterised by at least one potential jump barrier or surface barrier}
- 31/02021 {for solar cells ([electrical connection means](#), e.g. junction boxes, specially adapted for structural association with photovoltaic modules [H02S 40/34](#))}
- 31/02024 {Position sensitive and lateral effect photodetectors; Quadrant photodiodes}
- 31/02027 {for devices working in avalanche mode}
- 31/0203 . . . Containers; Encapsulations {, e.g. encapsulation of photodiodes} ([for photovoltaic devices \[H01L 31/048\]\(#\); for organic photosensitive devices \[H01L 51/44\]\(#\)](#))
- 31/0216 . . . Coatings ([H01L 31/041 takes precedence](#))
- 31/02161 . . . {for devices characterised by at least one potential jump barrier or surface barrier}
- 31/02162 {for filtering or shielding light, e.g. multicolour filters for photodetectors}
- 31/02164 {for shielding light, e.g. light blocking layers, cold shields for infra-red detectors}
- 31/02165 {using interference filters, e.g. multilayer dielectric filters ([interference filters \[G02B 5/28\]\(#\)](#))}
- 31/02167 {for solar cells}
- 31/02168 {the coatings being antireflective or having enhancing optical properties for the solar cells}
- 31/0224 . . . Electrodes
- 31/022408 . . . {for devices characterised by at least one potential jump barrier or surface barrier}
- 31/022416 {comprising ring electrodes}
- 31/022425 {for solar cells}
- 31/022433 {Particular geometry of the grid contacts}
- 31/022441 {Electrode arrangements specially adapted for back-contact solar cells}
- 31/02245 {for metallisation wrap-through [MWT] type solar cells}
- 31/022458 {for emitter wrap-through [EWT] type solar cells, e.g. interdigitated emitter-base back-contacts}
- 31/022466 . . . {made of transparent conductive layers, e.g. TCO, ITO layers}
- 31/022475 {composed of indium tin oxide [ITO]}
- 31/022483 {composed of zinc oxide [ZnO]}
- 31/022491 {composed of a thin transparent metal layer, e.g. gold}
- 31/0232 . . . Optical elements or arrangements associated with the device ([H01L 31/0236 takes precedence; for photovoltaic cells \[H01L 31/054\]\(#\); for photovoltaic modules \[H02S 40/20\]\(#\)](#))
- 31/02322 . . . {comprising luminescent members, e.g. fluorescent sheets upon the device}
- 31/02325 . . . {the optical elements not being integrated nor being directly associated with the device}

- 31/02327 . . . {the optical elements being integrated or being directly associated to the device, e.g. back reflectors ([optical coatings H01L 31/0216](#))}
- 31/0236 . . Special surface textures
- 31/02363 . . . {of the semiconductor body itself, e.g. textured active layers}
- 31/02366 . . . {of the substrate or of a layer on the substrate, e.g. textured ITO/glass substrate or superstrate, textured polymer layer on glass substrate}
- 31/024 . . Arrangements for cooling, heating, ventilating or temperature compensation ([for photovoltaic devices H01L 31/052](#))
- 31/0248 . characterised by their semiconductor bodies
- 31/0256 . . characterised by the material
- 31/0264 . . . Inorganic materials
- 31/0272 Selenium or tellurium
- 31/02725 {characterised by the doping material}
- 31/028 including, apart from doping material or other impurities, only elements of Group IV of the Periodic System
- 31/0284 {comprising porous silicon as part of the active layer(s) ([porous silicon as antireflective layer for photodiodes H01L 31/0216](#); [for solar cells H01L 31/02168](#))}
- 31/0288 characterised by the doping material
- 31/0296 including, apart from doping material or other impurities, only $A_{II}B_{VI}$ compounds, e.g. CdS, ZnS, HgCdTe
- 31/02963 {characterised by the doping material}
- 31/02966 {including ternary compounds, e.g. HgCdTe}
- 31/0304 including, apart from doping materials or other impurities, only $A_{III}B_V$ compounds
- 31/03042 {characterised by the doping material}
- 31/03044 {comprising a nitride compounds, e.g. GaN}
- 31/03046 {including ternary or quaternary compounds, e.g. GaAlAs, InGaAs, InGaAsP}
- 31/03048 {comprising a nitride compounds, e.g. InGaN}
- 31/0312 including, apart from doping materials or other impurities, only $A_{IV}B_{IV}$ compounds, e.g. SiC
- 31/03125 {characterised by the doping material}
- 31/032 including, apart from doping materials or other impurities, only compounds not provided for in groups [H01L 31/0272](#) - [H01L 31/0312](#)
- 31/0321 {characterised by the doping material ([H01L 31/0323](#), [H01L 31/0325 take precedence](#))}
- 31/0322 {comprising only $A_{IBIII}C_{VI}$ chalcopyrite compounds, e.g. Cu In Se₂, Cu Ga Se₂, Cu In Ga Se₂}
- 31/0323 {characterised by the doping material}
- 31/0324 {comprising only $A_{IV}B_{VI}$ or $A_{II}B_{IV}C_{VI}$ chalcogenide compounds, e.g. Pb Sn Te}
- 31/0325 {characterised by the doping material}
- 31/0326 {comprising $A_{IBII}C_{IV}D_{VI}$ kesterite compounds, e.g. Cu₂ZnSnSe₄, Cu₂ZnSnS₄}
- 31/0327 {characterised by the doping material}
- 31/0328 including, apart from doping materials or other impurities, semiconductor materials provided for in two or more of groups [H01L 31/0272](#) - [H01L 31/032](#)
- 31/0336 in different semiconductor regions, e.g. Cu₂X/CdX hetero-junctions, X being an element of Group VI of the Periodic System
- 31/03365 {comprising only Cu₂X / CdX heterojunctions, X being an element of Group VI of the Periodic System}
- 2031/0344 . . . {Organic materials}
- 31/0352 . . characterised by their shape or by the shapes, relative sizes or disposition of the semiconductor regions
- 31/035209 . . . {comprising a quantum structures}
- 31/035218 {the quantum structure being quantum dots}
- 31/035227 {the quantum structure being quantum wires, or nanorods ([carbon nanotubes H01L 51/0048](#))}
- 31/035236 . . . {Superlattices; Multiple quantum well structures}
- 31/035245 {characterised by amorphous semiconductor layers}
- 31/035254 {including, apart from doping materials or other impurities, only elements of Group IV of the Periodic System, e.g. Si-SiGe superlattices}
- 31/035263 {Doping superlattices, e.g. nipi superlattices}
- 31/035272 . . . {characterised by at least one potential jump barrier or surface barrier}
- 31/035281 {Shape of the body}
- 31/03529 {Shape of the potential jump barrier or surface barrier}
- 31/036 . . characterised by their crystalline structure or particular orientation of the crystalline planes
- 31/0368 . . . including polycrystalline semiconductors ([H01L 31/0392 takes precedence](#))
- 31/03682 {including only elements of Group IV of the Periodic System}
- 31/03685 {including microcrystalline silicon, uc-Si}
- 31/03687 {including microcrystalline $A_{IV}B_{IV}$ alloys, e.g. uc-SiGe, uc-SiC}
- 31/0376 . . . including amorphous semiconductors ([H01L 31/0392 takes precedence](#))
- 31/03762 {including only elements of Group IV of the Periodic System}
- 31/03765 {including $A_{IV}B_{IV}$ compounds or alloys, e.g. SiGe, SiC}
- 31/03767 {presenting light-induced characteristic variations, e.g. Staebler-Wronski effect}
- 31/0384 . . . including other non-monocrystalline materials, e.g. semiconductor particles embedded in an insulating material ([H01L 31/0392 takes precedence](#))
- 31/03845 {comprising semiconductor nanoparticles embedded in a semiconductor matrix ([in insulating matrix H01L 31/0384](#))}
- 31/0392 . . . including thin films deposited on metallic or insulating substrates {; characterised by specific substrate materials or substrate features or by the presence of intermediate layers, e.g. barrier layers, on the substrate ([textured substrates H01L 31/02366](#))}

- 31/03921 {including only elements of Group IV of the Periodic System}
- 31/03923 {including $A_{II}B_{III}C_{VI}$ compound materials, e.g. CIS, CIGS}
- 31/03925 {including $A_{II}B_{VI}$ compound materials, e.g. CdTe, CdS}
- 31/03926 {comprising a flexible substrate}
- 31/03928 {including $A_{II}B_{III}C_{VI}$ compound, e.g. CIS, CIGS deposited on metal or polymer foils}
- 31/04 adapted as photovoltaic [PV] conversion devices (testing thereof during manufacture [{H01L 22/00}](#); testing thereof after manufacture [H02S 50/10](#))
- 31/041 Provisions for preventing damage caused by corpuscular radiation, e.g. for space applications
- 31/042 PV modules or arrays of single PV cells (supporting structures for PV modules [H02S 20/00](#))
- 31/043 Mechanically stacked PV cells
- 31/044 including bypass diodes (bypass diodes in the junction box [H02S 40/34](#))
- 31/0443 comprising bypass diodes integrated or directly associated with the devices, e.g. bypass diodes integrated or formed in or on the same substrate as the photovoltaic cells
- 31/0445 including thin film solar cells, e.g. single thin film a-Si, CIS or CdTe solar cells
- 31/046 PV modules composed of a plurality of thin film solar cells deposited on the same substrate
- 31/0463 characterised by special patterning methods to connect the PV cells in a module, e.g. laser cutting of the conductive or active layers
- 31/0465 comprising particular structures for the electrical interconnection of adjacent PV cells in the module ([H01L 31/0463](#) takes precedence)
- 31/0468 comprising specific means for obtaining partial light transmission through the module, e.g. partially transparent thin film solar modules for windows
- 31/047 PV cell arrays including PV cells having multiple vertical junctions or multiple V-groove junctions formed in a semiconductor substrate
- 31/0475 PV cell arrays made by cells in a planar, e.g. repetitive, configuration on a single semiconductor substrate; PV cell microarrays (PV modules composed of a plurality of thin film solar cells deposited on the same substrate [H01L 31/046](#))
- 31/048 Encapsulation of modules
- 31/0481 {characterised by the composition of the encapsulation material}
- 31/0488 {Double glass encapsulation, e.g. photovoltaic cells arranged between front and rear glass sheets}
- 31/049 Protective back sheets
- 31/05 Electrical interconnection means between PV cells inside the PV module, e.g. series connection of PV cells (electrodes [H01L 31/0224](#); electrical interconnection of thin film solar cells formed on a common substrate [H01L 31/046](#); particular structures for electrical interconnecting of adjacent thin film solar cells in the module [H01L 31/0465](#); electrical interconnection means specially adapted for electrically connecting two or more PV modules [H02S 40/36](#))
- 31/0504 {specially adapted for series or parallel connection of solar cells in a module}
- 31/0508 {the interconnection means having a particular shape}
- 31/0512 {made of a particular material or composition of materials}
- 31/0516 {specially adapted for interconnection of back-contact solar cells}
- 31/052 Cooling means directly associated or integrated with the PV cell, e.g. integrated Peltier elements for active cooling or heat sinks directly associated with the PV cells (cooling means in combination with the PV module [H02S 40/42](#))
- 31/0521 {using a gaseous or a liquid coolant, e.g. air flow ventilation, water circulation}
- 31/0525 including means to utilise heat energy directly associated with the PV cell, e.g. integrated Seebeck elements
- 31/053 Energy storage means directly associated or integrated with the PV cell, e.g. a capacitor integrated with a PV cell (energy storage means associated with the PV module [H02S 40/38](#))
- 31/054 Optical elements directly associated or integrated with the PV cell, e.g. light-reflecting means or light-concentrating means
- 31/0543 {comprising light concentrating means of the refractive type, e.g. lenses}
- 31/0547 {comprising light concentrating means of the reflecting type, e.g. parabolic mirrors, concentrators using total internal reflection}
- 31/0549 {comprising spectrum splitting means, e.g. dichroic mirrors}
- 31/055 where light is absorbed and re-emitted at a different wavelength by the optical element directly associated or integrated with the PV cell, e.g. by using luminescent material, fluorescent concentrators or up-conversion arrangements
- 31/056 the light-reflecting means being of the back surface reflector [BSR] type
- 31/06 characterised by at least one potential-jump barrier or surface barrier
- 31/061 the potential barriers being of the point-contact type ([H01L 31/07](#) takes precedence)
- 31/062 the potential barriers being only of the metal-insulator-semiconductor type
- 31/065 the potential barriers being only of the graded gap type
- 31/068 the potential barriers being only of the PN homojunction type, e.g. bulk silicon PN homojunction solar cells or thin film polycrystalline silicon PN homojunction solar cells

31/0682	. . . . {back-junction, i.e. rearside emitter, solar cells, e.g. interdigitated base-emitter regions back-junction cells}	31/1032	. . . . . {the devices comprising active layers formed only by $A_{II}B_{VI}$ compounds, e.g. HgCdTe IR photodiodes}
31/0684	. . . . {double emitter cells, e.g. bifacial solar cells}	31/1035	. . . . . {the devices comprising active layers formed only by $A_{III}B_V$ compounds}
31/0687	. . . . Multiple junction or tandem solar cells	31/1037	. . . . . {the devices comprising active layers formed only by $A_{IV}B_{VI}$ compounds}
31/06875	. . . . . {inverted grown metamorphic [IMM] multiple junction solar cells, e.g. III-V compounds inverted metamorphic multi-junction cells}	31/105	. . . . . the potential barrier being of the PIN type
31/0693	. . . . the devices including, apart from doping material or other impurities, only $A_{III}B_V$ compounds, e.g. GaAs or InP solar cells	31/1055	. . . . . {the devices comprising amorphous materials of Group IV of the Periodic System}
31/07	. . . the potential barriers being only of the Schottky type	31/107	. . . . . the potential barrier working in avalanche mode, e.g. avalanche photodiode
31/072	. . . the potential barriers being only of the PN heterojunction type	31/1075	. . . . . {in which the active layers, e.g. absorption or multiplication layers, form an heterostructure, e.g. SAM structure}
31/0725	. . . . Multiple junction or tandem solar cells	31/108	. . . . . the potential barrier being of the Schottky type
31/073	. . . . comprising only $A_{II}B_{VI}$ compound semiconductors, e.g. CdS/CdTe solar cells	31/1085	. . . . . {the devices being of the Metal-Semiconductor-Metal [MSM] Schottky barrier type}
31/0735	. . . . comprising only $A_{III}B_V$ compound semiconductors, e.g. GaAs/AlGaAs or InP/GaInAs solar cells	31/109	. . . . . the potential barrier being of the PN heterojunction type
31/074	. . . . comprising a heterojunction with an element of Group IV of the Periodic System, e.g. ITO/Si, GaAs/Si or CdTe/Si solar cells	31/11	. . . . characterised by two potential barriers or surface barriers, e.g. bipolar phototransistor
31/0745	. . . . comprising a $A_{IV}B_{IV}$ heterojunction, e.g. Si/Ge, SiGe/Si or Si/SiC solar cells	31/1105	. . . . . {the device being a bipolar phototransistor}
31/0747	. . . . . comprising a heterojunction of crystalline and amorphous materials, e.g. heterojunction with intrinsic thin layer or HIT® solar cells; solar cells	31/111	. . . . characterised by at least three potential barriers, e.g. photothyristor
31/0749	. . . . including a $A_{IB_{III}C_{VI}}$ compound, e.g. CdS/CuInSe ₂ [CIS] heterojunction solar cells	31/1113	. . . . . {the device being a photothyristor}
31/075	. . . the potential barriers being only of the PIN type	31/1116	. . . . . {of the static induction type}
31/076	. . . . Multiple junction or tandem solar cells	31/112	. . . . characterised by field-effect operation, e.g. junction field-effect phototransistor
31/077	. . . . the devices comprising monocrystalline or polycrystalline materials	31/1121	. . . . . {Devices with Schottky gate}
31/078	. . . including different types of potential barriers provided for in two or more of groups H01L 31/062 - H01L 31/075	31/1122	. . . . . {the device being a CCD device}
31/08	. in which radiation controls flow of current through the device, e.g. photoresistors	31/1123	. . . . . {the device being a photo MESFET}
31/085	. . {the device being sensitive to very short wavelength, e.g. X-ray, Gamma-rays}	31/1124	. . . . . {Devices with PN homojunction gate}
31/09	. . Devices sensitive to infra-red, visible or ultraviolet radiation (H01L 31/101 takes precedence)	31/1125	. . . . . {the device being a CCD device}
31/095	. . . {comprising amorphous semiconductors}	31/1126	. . . . . {the device being a field-effect phototransistor}
31/10	. . characterised by at least one potential-jump barrier or surface barrier, e.g. phototransistors	31/1127	. . . . . {Devices with PN heterojunction gate}
31/101	. . . Devices sensitive to infra-red, visible or ultraviolet radiation	31/1128	. . . . . {the device being a CCD device}
31/1013	. . . . {devices sensitive to two or more wavelengths, e.g. multi-spectrum radiation detection devices}	31/1129	. . . . . {the device being a field-effect phototransistor}
31/1016	. . . . {comprising transparent or semitransparent devices}	31/113	. . . . . being of the conductor-insulator-semiconductor type, e.g. metal-insulator-semiconductor field-effect transistor
31/102	. . . . characterised by only one potential barrier or surface barrier	31/1133	. . . . . {the device being a conductor-insulator-semiconductor diode or a CCD device}
31/1025	. . . . . {the potential barrier being of the point contact type}	31/1136	. . . . . {the device being a metal-insulator-semiconductor field-effect transistor}
31/103	. . . . . the potential barrier being of the PN homojunction type	31/115	. . . Devices sensitive to very short wavelength, e.g. X-rays, gamma-rays or corpuscular radiation
		31/117	. . . . of the bulk effect radiation detector type, e.g. Ge-Li compensated PIN gamma-ray detectors
		31/1175	. . . . . {Li compensated PIN gamma-ray detectors}
		31/118	. . . . of the surface barrier or shallow PN junction detector type, e.g. surface barrier alpha-particle detectors
		31/1185	. . . . . {of the shallow PN junction detector type}
		31/119	. . . . characterised by field-effect operation, e.g. MIS type detectors

- 31/12 . . . structurally associated with, e.g. formed in or on a common substrate with, one or more electric light sources, e.g. electroluminescent light sources, and electrically or optically coupled thereto ([semiconductor devices with at least one potential barrier or surface barrier adapted for light emission H01L 33/00](#); [amplifiers using electroluminescent element and photocell H03F 17/00](#); [electroluminescent light sources per se H05B 33/00](#))
- 31/125 . . . {Composite devices with photosensitive elements and electroluminescent elements within one single body}
- 31/14 . . . the light source or sources being controlled by the semiconductor device sensitive to radiation, e.g. image converters, image amplifiers or image storage devices
- 31/141 . . . {the semiconductor device sensitive to radiation being without a potential-jump barrier or surface barrier}
- 31/143 {the light source being a semiconductor device with at least one potential-jump barrier or surface barrier, e.g. light emitting diode}
- 31/145 . . . {the semiconductor device sensitive to radiation being characterised by at least one potential-jump barrier or surface barrier}
- 31/147 . . . the light sources and the devices sensitive to radiation all being semiconductor devices characterised by at least one potential or surface barrier
- 31/153 formed in, or on, a common substrate
- 31/16 . . . the semiconductor device sensitive to radiation being controlled by the light source or sources
- 31/161 . . . {Semiconductor device sensitive to radiation without a potential-jump or surface barrier, e.g. photoresistors}
- 31/162 {the light source being a semiconductor device with at least one potential-jump barrier or surface barrier, e.g. a light emitting diode}
- 31/164 {Optical potentiometers}
- 31/165 . . . {the semiconductor sensitive to radiation being characterised by at least one potential-jump or surface barrier}
- 31/167 . . . the light sources and the devices sensitive to radiation all being semiconductor devices characterised by at least one potential or surface barrier
- 31/173 formed in, or on, a common substrate
- 31/18 . . . Processes or apparatus specially adapted for the manufacture or treatment of these devices or of parts thereof
- 31/1804 . . . {comprising only elements of Group IV of the Periodic System}
- 31/1808 . . . {including only Ge}
- 31/1812 . . . {including only $A_{IV}B_{IV}$ alloys, e.g. SiGe}
- 31/1816 {Special manufacturing methods for microcrystalline layers, e.g. uc-SiGe, uc-SiC}
- 31/182 . . . {Special manufacturing methods for polycrystalline Si, e.g. Si ribbon, poly Si ingots, thin films of polycrystalline Si}
- 31/1824 {Special manufacturing methods for microcrystalline Si, uc-Si}
- 31/1828 . . . {the active layers comprising only $A_{II}B_{VI}$ compounds, e.g. CdS, ZnS, CdTe}
- 31/1832 . . . {comprising ternary compounds, e.g. Hg Cd Te}
- 31/1836 . . . {comprising a growth substrate not being an $A_{II}B_{VI}$ compound}
- 31/184 . . . {the active layers comprising only $A_{III}B_V$ compounds, e.g. GaAs, InP}
- 31/1844 . . . {comprising ternary or quaternary compounds, e.g. Ga Al As, In Ga As P}
- 31/1848 {comprising nitride compounds, e.g. InGaN, InGaAlN}
- 31/1852 . . . {comprising a growth substrate not being an $A_{III}B_V$ compound}
- 31/1856 . . . {comprising nitride compounds, e.g. GaN}
- 31/186 . . . {Particular post-treatment for the devices, e.g. annealing, impurity gettering, short-circuit elimination, recrystallisation}
- 31/1864 . . . {Annealing}
- 31/1868 . . . {Passivation}
- 31/1872 . . . {Recrystallisation}
- 31/1876 . . . {Particular processes or apparatus for batch treatment of the devices}
- 31/188 . . . {Apparatus specially adapted for automatic interconnection of solar cells in a module}
- 31/1884 . . . {Manufacture of transparent electrodes, e.g. TCO, ITO}
- 31/1888 . . . {methods for etching transparent electrodes}
- 31/1892 . . . {methods involving the use of temporary, removable substrates}
- 31/1896 . . . {for thin-film semiconductors}
- 31/20 . . . such devices or parts thereof comprising amorphous semiconductor materials
- 31/202 . . . {including only elements of Group IV of the Periodic System}
- 31/204 {including $A_{IV}B_{IV}$ alloys, e.g. SiGe, SiC}
- 31/206 . . . {Particular processes or apparatus for continuous treatment of the devices, e.g. roll-to roll processes, multi-chamber deposition}
- 31/208 . . . {Particular post-treatment of the devices, e.g. annealing, short-circuit elimination}
- 33/00** **Semiconductor devices with at least one potential-jump barrier or surface barrier specially adapted for light emission; Processes or apparatus specially adapted for the manufacture or treatment thereof or of parts thereof; Details thereof ([H01L 51/50](#) takes precedence; devices consisting of a plurality of semiconductor components formed in or on a common substrate and including semiconductor components with at least one potential-jump barrier or surface barrier, specially adapted for light emission [H01L 27/15](#); semiconductor lasers [H01S 5/00](#))**
- NOTE**
- This group covers light emitting diodes [LEDs] or superluminescent diodes [SLDs], including LEDs or SLDs emitting infra-red [IR] light or ultra-violet [UV] light.
- 33/0004 . . . {Devices characterised by their operation}
- 33/0008 . . . {having p-n or hi-lo junctions}
- 33/0012 . . . {p-i-n devices}
- 33/0016 . . . {having at least two p-n junctions}
- 33/002 . . . {having heterojunctions or graded gap}

33/0025	. . . {comprising only $A_{III}B_V$ compounds}	33/285	. . . . {characterised by the doping materials}
33/0029	. . . {comprising only $A_{II}B_{VI}$ compounds}	33/30	. . . containing only elements of group III and group V of the periodic system
33/0033	. . {having Schottky barriers}	33/305	. . . . {characterised by the doping materials}
33/0037	. . {having a MIS barrier layer}	33/32	. . . . containing nitrogen
33/0041	. . {characterised by field-effect operation}	33/325	. . . . . {characterised by the doping materials}
33/0045	. . {the devices being superluminescent diodes}	33/34	. . . containing only elements of group IV of the periodic system
33/005	. {Processes}	33/343	. . . . {characterised by the doping materials}
33/0054	. . {for devices with an active region comprising only group IV elements}	33/346	. . . . {containing porous silicon}
33/0058	. . . {comprising amorphous semiconductors}	33/36	. characterised by the electrodes
33/0062	. . {for devices with an active region comprising only III-V compounds}	33/38	. . with a particular shape
33/0066	. . . {with a substrate not being a III-V compound}	33/382	. . . {the electrode extending partially in or entirely through the semiconductor body}
33/007	. . . . {comprising nitride compounds}	33/385	. . . {the electrode extending at least partially onto a side surface of the semiconductor body}
33/0075	. . . {comprising nitride compounds}	33/387	. . . {with a plurality of electrode regions in direct contact with the semiconductor body and being electrically interconnected by another electrode layer}
33/0083	. . {for devices with an active region comprising only II-VI compounds}	33/40	. . Materials therefor
33/0087	. . . {with a substrate not being a II-VI compound}	33/405	. . . {Reflective materials}
33/0091	. . {for devices with an active region comprising only IV-VI compounds}	33/42	. . . Transparent materials
33/0093	. . {Wafer bonding; Removal of the growth substrate}	33/44	. characterised by the coatings, e.g. passivation layer or anti-reflective coating
33/0095	. . {Post-treatment of devices, e.g. annealing, recrystallisation or short-circuit elimination}	33/46	. . Reflective coating, e.g. dielectric Bragg reflector
33/02	. characterised by the semiconductor bodies	33/465	. . . {with a resonant cavity structure}
33/025	. . {Physical imperfections, e.g. particular concentration or distribution of impurities}	33/48	. characterised by the semiconductor body packages
33/04	. . with a quantum effect structure or superlattice, e.g. tunnel junction	NOTE	
33/06	. . . within the light emitting region, e.g. quantum confinement structure or tunnel barrier	This group covers elements in intimate contact with the semiconductor body or integrated with the package	
33/08	. . with a plurality of light emitting regions, e.g. laterally discontinuous light emitting layer or photoluminescent region integrated within the semiconductor body (H01L 27/15 takes precedence)	33/483	. . {Containers}
33/10	. . with a light reflecting structure, e.g. semiconductor Bragg reflector	33/486	. . . {adapted for surface mounting}
33/105	. . . {with a resonant cavity structure}	33/50	. . Wavelength conversion elements
33/12	. . with a stress relaxation structure, e.g. buffer layer	33/501	. . . {characterised by the materials, e.g. binder}
33/14	. . with a carrier transport control structure, e.g. highly-doped semiconductor layer or current-blocking structure	33/502	. . . . {Wavelength conversion materials}
33/145	. . . {with a current-blocking structure}	33/504	. . . . . {Elements with two or more wavelength conversion materials}
33/16	. . with a particular crystal structure or orientation, e.g. polycrystalline, amorphous or porous	33/505	. . . {characterised by the shape, e.g. plate or foil}
33/18	. . . within the light emitting region	33/507	. . . {the elements being in intimate contact with parts other than the semiconductor body or integrated with parts other than the semiconductor body}
NOTE		33/508	. . . {having a non-uniform spatial arrangement or non-uniform concentration, e.g. patterned wavelength conversion layer, wavelength conversion layer with a concentration gradient of the wavelength conversion material}
When classifying in this group, classification is also made in group H01L 33/26 or one of its subgroups in order to identify the chemical composition of the light emitting region		33/52	. . Encapsulations
33/20	. . with a particular shape, e.g. curved or truncated substrate	33/54	. . . having a particular shape
33/22	. . . Roughened surfaces, e.g. at the interface between epitaxial layers	33/56	. . . Materials, e.g. epoxy or silicone resin
33/24	. . . of the light emitting region, e.g. non-planar junction	33/58	. . Optical field-shaping elements
33/26	. . Materials of the light emitting region	33/60	. . . Reflective elements
33/28	. . . containing only elements of group II and group VI of the periodic system	33/62	. . Arrangements for conducting electric current to or from the semiconductor body, e.g. lead-frames, wire-bonds or solder balls
		33/64	. . Heat extraction or cooling elements
		33/641	. . . {characterized by the materials}
		33/642	. . . {characterized by the shape}
		33/644	. . . {in intimate contact or integrated with parts of the device other than the semiconductor body}

- 33/645 . . . {the elements being electrically controlled, e.g. Peltier elements}
- 33/647 . . . {the elements conducting electric current to or from the semiconductor body}
- 33/648 . . . {the elements comprising fluids, e.g. heat-pipes}
- 35/00 Thermoelectric devices comprising a junction of dissimilar materials, i.e. exhibiting Seebeck or Peltier effect with or without other thermoelectric effects or thermomagnetic effects; Processes or apparatus peculiar to the manufacture or treatment thereof or of parts thereof; Details thereof (devices consisting of a plurality of solid state components formed in or on a common substrate H01L 27/00)**
 - 35/02 . Details
 - 35/04 . . Structural details of the junction; Connections of leads
 - 35/06 . . . detachable, e.g. using a spring
 - 35/08 . . . non-detachable, e.g. cemented, sintered, soldered {, e.g. thin films}
 - 35/10 . . . Connections of leads
 - 35/12 . Selection of the material for the legs of the junction
 - 35/14 . . using inorganic compositions
 - 35/16 . . . comprising tellurium or selenium or sulfur
 - 35/18 . . . comprising arsenic or antimony or bismuth (H01L 35/16 takes precedence), {e.g. $A_{III}B_V$ compounds}
 - 35/20 . . . comprising metals only (H01L 35/16, H01L 35/18 take precedence)
 - 35/22 . . . comprising compounds containing boron, carbon, oxygen or nitrogen {or germanium or silicon, e.g. superconductors}
 - 35/225 {Superconducting materials}
 - 35/24 . . using organic compositions
 - 35/26 . . using compositions changing continuously or discontinuously inside the material
 - 35/28 . operating with Peltier or Seebeck effect only
 - 35/30 . . characterised by the heat-exchanging means at the junction
 - 35/32 . . characterised by the structure or configuration of the cell or thermocouple forming the device {including details about housing, insulation, geometry or module}
 - 35/325 . . . {Cascades of thermocouples}
 - 35/34 . Processes or apparatus specially adapted for peculiar to the manufacture or treatment of these devices or of parts thereof
- 37/00 Thermoelectric devices without a junction of dissimilar materials; Thermomagnetic devices, e.g. using Nernst-Ettinghausen effect; Processes or apparatus peculiar to the manufacture or treatment thereof or of parts thereof (devices consisting of a plurality of solid state components formed in or on a common substrate H01L 27/00)**
 - 37/02 . using thermal change of dielectric constant, e.g. working above and below Curie point {, e.g. pyroelectric devices}
 - 37/025 . . {Selection of materials}
 - 37/04 . using thermal change of magnetic permeability, e.g. working above and below the Curie point {, e.g. pyromagnetic devices}

39/00

Devices using superconductivity; Processes or apparatus peculiar to the manufacture or treatment thereof or of parts thereof (devices consisting of a plurality of solid state components formed in or on a common substrate H01L 27/00; {light detection G01J, G02F 2/00; application to memories G11C 11/44, G11C 15/00, G11C 19/32} ; superconducting conductors cables or transmission lines H01B 12/00; {microwaves H01P 7/00, H01P 11/00} ; superconductive coils or windings H01F; amplifiers using superconductivity H03F 19/00; {impulse generators and logic circuits H03K 3/38, H03K 17/92, H03K 19/195; lasers H01S 3/00, H01S 5/00})

NOTE

In this group, in the absence of an indication to the contrary, an invention is classified in the last appropriate place

- 39/005 . {Alleged superconductivity}
- 39/02 . Details
 - 39/025 . . {for Josephson devices}
 - 39/04 . . Containers; Mountings
 - 39/045 . . . {for Josephson devices}
 - 39/06 . . characterised by the current path
 - 39/08 . . characterised by the shape of the element
 - 39/10 . . characterised by the means for switching {between superconductive and normal states}
 - 39/12 . . characterised by the material
 - 39/121 . . . {Organic materials}
 - 39/123 {Fullerene superconductors, e.g. soccerball-shaped allotrope of carbon, e.g. C_{60} , C_{94} (fullerenes in general C07C 13/00)}
 - 39/125 {Ceramic materials}
 - 39/126 {comprising copper oxide}
 - 39/128 {Multi-layered structures, e.g. super lattices}
 - 39/14 . Permanent superconductor devices
 - 39/141 . . {comprising metal borides, e.g. MgB_2 }
 - 39/143 . . {comprising high T_c ceramic materials}
 - 39/145 . . {Three or more electrode devices (H01L 39/228 takes precedence)}
 - 39/146 . . . {Field effect devices}
 - 39/148 . . {Abrikosov vortex devices}
 - 39/16 . Devices switchable between superconductive and normal states {, e.g. switches, current limiters (circuits for current limitation using superconductor elements H02H 9/023)}
 - 39/18 . . Cryotrons
 - 39/20 . . . Power cryotrons
 - 39/22 . Devices comprising a junction of dissimilar materials, e.g. Josephson-effect devices
 - 39/221 . . {Single electron tunnelling devices}
 - 39/223 . . {Josephson-effect devices}
 - 39/225 . . . {comprising high T_c ceramic materials}
 - 39/226 . . . {comprising metal borides, e.g. MgB_2 }
 - 39/228 . . {three or more electrode devices, e.g. transistor-like structures}
 - 39/24 . Processes or apparatus peculiar to the manufacture or treatment of devices provided for in H01L 39/00 or of parts thereof

- 39/2403 . . {Processes peculiar to the manufacture or treatment of composite superconductor filaments (comprising copper oxide [H01L 39/2419](#))}
- 39/2406 . . {of devices comprising Nb or an alloy of Nb with one or more of the elements of group 4, e.g. Ti, Zr, Hf}
- 39/2409 . . {of devices comprising an intermetallic compound of type A-15, e.g. Nb₃Sn}
- 39/2412 . . {of devices comprising molybdenum chalcogenides}
- 39/2416 . . {of devices comprising nitrides or carbonitrides}
- 39/2419 . . {the superconducting material comprising copper oxide}
- 39/2422 . . . {Processes for depositing or forming superconductor layers}
- 39/2425 {from a solution}
- 39/2429 {from a suspension or slurry, e.g. screen printing; doctor blade casting}
- 39/2432 {by evaporation independent of heat source, e.g. MBE}
- 39/2435 {by sputtering}
- 39/2438 {by chemical vapour deposition [CVD]}
- 39/2441 {by metalloorganic chemical vapour deposition [MOCVD]}
- 39/2445 {by thermal spraying, e.g. plasma deposition}
- 39/2448 {Pulsed laser deposition, e.g. laser sputtering; laser ablation}
- 39/2451 {Precursor deposition followed by after-treatment, e.g. oxidation}
- 39/2454 {characterised by the substrate}
- 39/2458 {Monocrystalline substrates, e.g. epitaxial growth}
- 39/2461 {Intermediate layers, e.g. for growth control}
- 39/2464 . . . {After-treatment, e.g. patterning}
- 39/2467 {Etching}
- 39/247 {Passivation}
- 39/2474 . . . {Manufacture or deposition of contacts or electrodes}
- 39/2477 . . . {Processes including the use of precursors}
- 39/248 . . . {Processes peculiar to the manufacture or treatment of filaments or composite wires}
- 39/2483 . . . {Introducing flux pinning centres}
- 39/2487 . . {of devices comprising metal borides, e.g. MgB₂}
- 39/249 . . {Treatment of superconductive layers by irradiation, e.g. ion-beam, electron-beam, laser beam, X-rays (irradiation devices [G21K](#), [H01J](#))}
- 39/2493 . . {for Josephson devices}
- 39/2496 . . . {comprising high T_c ceramic materials}

41/00

Piezo-electric devices in general; Electrostrictive devices in general; Magnetostrictive devices in general; Processes or apparatus specially adapted for the manufacture or treatment thereof or of parts thereof; Details thereof (devices consisting of a plurality of solid-state components formed in or on a common substrate [H01L 27/00](#))

WARNING

Groups [H01L 41/23-H01L 41/47](#) are incomplete pending reclassification of documents from group [H01L 41/22](#).

Groups [H01L 41/23-H01L 41/47](#) and [H01L 41/22](#) should be considered in order to perform a complete search.

- 41/02 . Details
- 41/04 . . of piezo-electric or electrostrictive devices
- 41/042 . . . {Drive or control circuitry or methods for piezo-electric or electrostrictive devices not otherwise provided for}
- 41/044 {for piezoelectric transformers (conversion of DC or AC power [H02M](#); for operating discharge lamps [H05B 41/282](#))}
- 41/047 . . . Electrodes {or electrical connection arrangements}
- 41/0471 {Individual layer electrodes of multilayer piezo-electric or electrostrictive devices, e.g. internal electrodes}
- 41/0472 {Connection electrodes of multilayer piezo-electric or electrostrictive devices, e.g. external electrodes}
- 41/0474 {embedded within piezo-electric or electrostrictive material, e.g. via connections}
- 41/0475 {Further connection or lead arrangements, e.g. flexible wiring boards, terminal pins}
- 41/0477 {Conductive materials (in general [H01B 1/00](#))}
- 41/0478 {the principal material being non-metallic, e.g. oxide or carbon based}
- 41/053 . . . Mounts, supports, enclosures or casings
- 41/0533 {Further insulation means against electrical, physical or chemical damage, e.g. protective coatings}
- 41/0536 {Mechanical prestressing means, e.g. springs (in general [F16F 1/00](#))}
- 41/06 . . of magnetostrictive devices
- 41/08 . Piezo-electric or electrostrictive devices
- 41/0805 . . {based on piezo-electric or electrostrictive films or coatings}
- 41/081 . . . {characterised by the underlying base, e.g. substrates}
- 41/0815 {Intermediate layers, e.g. barrier, adhesion or growth control buffer layers}
- 41/082 . . {based on piezo-electric or electrostrictive fibres}
- 41/0825 . . {with electrical and mechanical input and output, e.g. having combined actuator and sensor parts}
- 41/083 . . having a stacked or multilayer structure
- 41/0831 . . . {with non-rectangular cross-section in stacking direction, e.g. polygonal, trapezoidal}
- 41/0833 . . . {with non-rectangular cross-section orthogonal to the stacking direction, e.g. polygonal, circular}
- 41/0835 {Annular cross-section}

- 41/0836 . . . {of cylindrical shape with stacking in radial direction, e.g. coaxial or spiral type rolls}
 - 41/0838 . . . {adapted for alleviating internal stress, e.g. cracking control layers ("Sollbruchstellen")}
 - 41/087 . . formed as coaxial cables
 - 41/09 . . with electrical input and mechanical output {, e.g. actuators, vibrators (in frequency selective networks [H03H 9/00](#))}
 - 41/0906 . . . {using longitudinal or thickness displacement combined with bending, shear or torsion displacement}
 - 41/0913 {with polygonal or rectangular shape}
 - 41/092 {with cylindrical or annular shape}
 - 41/0926 . . . {using bending displacement, e.g. unimorph, bimorph or multimorph cantilever or membrane benders}
 - 41/0933 {Beam type}
 - 41/094 {Cantilevers, i.e. having one fixed end}
 - 41/0946 {connected at their free ends, e.g. parallelogram type}
 - 41/0953 {with multiple segments mechanically connected in series, e.g. zig-zag type}
 - 41/096 {adapted for in-plane bending displacement}
 - 41/0966 {adapted for multi-directional bending displacement}
 - 41/0973 {Membrane type}
 - 41/098 {with non-planar shape}
 - 41/0986 . . . {using longitudinal or thickness displacement only, e.g. d33 or d31 type devices}
 - 41/0993 . . . {using shear or torsion displacement, e.g. d15 type devices}
 - 41/107 . . with electrical input and electrical output {, e.g. transformers}
 - 41/113 . . with mechanical input and electrical output {, e.g. generators, sensors}
 - 41/1132 . . . {Sensors}
 - 41/1134 . . . {Beam type}
 - 41/1136 {Cantilevers}
 - 41/1138 . . . {Membrane type}
 - 41/12 . . Magnetostrictive devices
 - 41/125 . . {with mechanical input and electrical output, e.g. generators, sensors}
 - 41/16 . . Selection of materials
 - 41/18 . . for piezo-electric or electrostrictive devices {, e.g. bulk piezo-electric crystals}
 - 41/183 . . . {Composite materials, e.g. having 1-3 or 2-2 type connectivity}
 - 41/187 . . . Ceramic compositions {, i.e. synthetic inorganic polycrystalline compounds incl. epitaxial, quasi-crystalline materials}
 - 41/1871 {Alkaline earth metal based oxides, e.g. barium titanates}
 - 41/1873 {Alkali metal based oxides, e.g. lithium, sodium or potassium niobates}
 - 41/1875 {Lead based oxides}
 - 41/1876 {Lead zirconate titanate based}
 - 41/1878 {Bismuth based oxides}
 - 41/193 . . . Macromolecular compositions {, e.g. piezo-electric polymers}
 - 41/20 . . for magnetostrictive devices
 - 41/22 . . Processes or apparatus specially adapted for the assembly, manufacture or treatment of piezo-electric or electrostrictive devices or of parts thereof
 - 41/23 . . Forming enclosures or casings
 - 41/25 . . Assembling devices that include piezo-electric or electrostrictive parts
 - 41/253 . . Treating devices or parts thereof to modify a piezo-electric or electrostrictive property, e.g. polarisation characteristics, vibration characteristics or mode tuning
 - 41/257 . . . by polarising
 - 41/27 . . Manufacturing multilayered piezo-electric or electrostrictive devices or parts thereof, e.g. by stacking piezo-electric bodies and electrodes
 - 41/273 . . . by integrally sintering piezo-electric or electrostrictive bodies and electrodes
 - 41/277 . . . by stacking bulk piezo-electric or electrostrictive bodies and electrodes
 - 41/29 . . Forming electrodes, leads or terminal arrangements
 - 41/293 . . . Connection electrodes of multilayered piezo-electric or electrostrictive parts
- NOTE**
- Integral individual layer electrode and connection electrode are classified in both [H01L 41/293](#) and [H01L 41/297](#)
- 41/297 . . . Individual layer electrodes of multilayered piezo-electric or electrostrictive parts
- NOTE**
- Integral individual layer electrode and connection electrode are classified in both [H01L 41/293](#) and [H01L 41/297](#)
- 41/31 . . Applying piezo-electric or electrostrictive parts or bodies onto an electrical element or another base
 - 41/311 . . . Mounting of piezo-electric or electrostrictive parts together with semiconductor elements, or other circuit elements, on a common substrate
 - 41/312 . . . by laminating or bonding of piezo-electric or electrostrictive bodies
 - 41/313 by metal fusing or with adhesives
 - 41/314 . . . by depositing piezo-electric or electrostrictive layers, e.g. aerosol or screen printing
 - 41/316 by vapour phase deposition
 - 41/317 by liquid phase deposition
 - 41/318 by sol-gel deposition
 - 41/319 using intermediate layers, e.g. for growth control
 - 41/33 . . Shaping or machining of piezo-electric or electrostrictive bodies
 - 41/331 . . . by coating or depositing using masks, e.g. lift-off
 - 41/332 . . . by etching, e.g. lithography
 - 41/333 . . . by moulding or extrusion
 - 41/335 . . . by machining
 - 41/337 by polishing or grinding
 - 41/338 by cutting or dicing
 - 41/339 by punching
 - 41/35 . . Forming piezo-electric or electrostrictive materials
 - 41/37 . . . Composite materials
 - 41/39 . . . Inorganic materials

- 41/41 by melting
- 41/43 by sintering
- 41/45 . . . Organic materials
- 41/47 . Processes or apparatus specially adapted for the assembly, manufacture or treatment of magnetostrictive devices or of parts thereof
- 43/00 Devices using galvano-magnetic or similar magnetic effects; Processes or apparatus specially adapted for the manufacture or treatment thereof or of parts thereof (devices consisting of a plurality of solid state components formed in or on a common substrate [H01L 27/00](#))**
 - 43/02 . Details
 - 43/04 . . of Hall-effect devices
 - 43/06 . Hall-effect devices
 - 43/065 . . {Semiconductor Hall-effect devices}
 - 43/08 . Magnetic-field-controlled resistors
 - 43/10 . Selection of materials
 - 43/12 . Processes or apparatus specially adapted for the manufacture or treatment of these devices or of parts thereof
 - 43/14 . . for Hall-effect devices
- 45/00 Solid state devices adapted for rectifying, amplifying, oscillating or switching without a potential-jump barrier or surface barrier, e.g. dielectric triodes; Ovshinsky-effect devices; Processes or apparatus peculiar to the manufacture or treatment thereof or of parts thereof (devices consisting of a plurality of solid state components formed in or on a common substrate [H01L 27/00](#); devices using superconductivity [H01L 39/00](#); piezo-electric devices [H01L 41/00](#); bulk negative resistance effect devices [H01L 47/00](#); {memories [G11C 11/34](#); [G11C 13/0002](#); amplifying circuits [H03F 11/00](#); pulse generation [H03K 3/02](#); electronic switching circuits [H03K 17/00](#); logic circuits [H03K 19/00](#)})**
 - 45/005 . {Charge density wave transport devices}
 - 45/02 . Solid state travelling-wave devices
 - 45/04 . {Bistable or multistable switching devices, e.g. for resistance switching non-volatile memory}
 - 45/06 . . {based on solid-state phase change, e.g. between amorphous and crystalline phases, Ovshinsky effect}
 - 45/065 . . . {between different crystalline phases, e.g. cubic and hexagonal}
 - 45/08 . . {based on migration or redistribution of ionic species, e.g. anions, vacancies}
 - 45/085 . . . {the species being metal cations, e.g. programmable metallization cells}
 - 45/10 . . {based on bulk electronic defects, e.g. trapping of electrons}
 - 45/12 . . {Details}
 - 45/1206 . . . {Three or more terminal devices, e.g. transistor like devices}
 - 45/1213 . . . {Radiation or particle beam assisted switching devices, e.g. optically controlled devices}
 - 45/122 . . . {Device geometry}
 - 45/1226 {adapted for essentially horizontal current flow, e.g. bridge type devices}
 - 45/1233 {adapted for essentially vertical current flow, e.g. sandwich or pillar type devices}
 - 45/124 {on sidewalls of dielectric structures, e.g. mesa or cup type devices}
 - 45/1246 {Further means within the switching material region to limit current flow, e.g. constrictions}
 - 45/1253 . . . {Electrodes}
 - 45/126 {adapted for resistive heating}
 - 45/1266 {adapted for supplying ionic species}
 - 45/1273 {adapted for electric field or current focusing, e.g. tip shaped}
 - 45/128 . . . {Thermal details}
 - 45/1286 {Heating or cooling means other than resistive heating electrodes, e.g. heater in parallel}
 - 45/1293 {Thermal insulation means}
 - 45/14 . . {Selection of switching materials}
 - 45/141 . . . {Compounds of sulfur, selenium or tellurium, e.g. chalcogenides}
 - 45/142 {Sulfides, e.g. CuS}
 - 45/143 {Selenides, e.g. GeSe}
 - 45/144 {Tellurides, e.g. GeSbTe}
 - 45/145 . . . {Oxides or nitrides}
 - 45/146 {Binary metal oxides, e.g. TaOx}
 - 45/147 {Complex metal oxides, e.g. perovskites, spinels}
 - 45/148 . . . {Other compounds of groups 13-15, e.g. elemental or compound semiconductors}
 - 45/149 {Carbon or carbides}
 - 45/16 . . {Manufacturing}
 - 45/1608 . . . {Formation of the switching material, e.g. layer deposition}
 - 45/1616 {by chemical vapor deposition, e.g. MOCVD, ALD}
 - 45/1625 {by physical vapor deposition, e.g. sputtering}
 - 45/1633 {by conversion of electrode material, e.g. oxidation}
 - 45/1641 . . . {Modification of the switching material, e.g. post-treatment, doping}
 - 45/165 {by implantation}
 - 45/1658 {by diffusion, e.g. photo-dissolution}
 - 45/1666 . . . {Patterning of the switching material}
 - 45/1675 {by etching of pre-deposited switching material layers, e.g. lithography}
 - 45/1683 {by filling of openings, e.g. damascene method}
 - 45/1691 {Patterning process specially adapted for achieving sub-lithographic dimensions, e.g. using spacers}
- 47/00 Bulk negative resistance effect devices, e.g. Gunn-effect devices; Processes or apparatus peculiar to the manufacture or treatment thereof or of parts thereof (devices consisting of a plurality of solid state components formed in or on a common substrate [H01L 27/00](#))**
 - 47/005 . {Processes or apparatus peculiar to the manufacture or treatment of these devices or of parts thereof (not peculiar thereto [H01L 21/00](#))}
 - 47/02 . Gunn-effect devices {or transferred electron devices}
 - 47/023 . . {controlled by electromagnetic radiation}
 - 47/026 . . {Gunn diodes ([H01L 47/02](#) takes precedence)}

49/00 Solid state devices not provided for in groups [H01L 27/00](#) - [H01L 47/00](#) and [H01L 51/00](#) and not provided for in any other subclass; Processes or apparatus peculiar to the manufacture or treatment thereof or of parts thereof

- 49/003 . {Devices using Mott metal-insulator transition, e.g. field effect transistors}
- 49/006 . {Quantum devices, e.g. Quantum Interference Devices, Metal Single Electron Transistor (using semiconductors in the active part [H01L 29/00](#))}
- 49/02 . Thin-film or thick-film devices

51/00 Solid state devices using organic materials as the active part, or using a combination of organic materials with other materials as the active part; Processes or apparatus specially adapted for the manufacture or treatment of such devices, or of parts thereof (devices consisting of a plurality of components formed in or on a common substrate [H01L 27/28](#); thermoelectric devices using organic material [H01L 35/00](#), [H01L 37/00](#); piezoelectric, electrostrictive or magnetostrictive elements using organic material [H01L 41/00](#))

- 51/0001 . {Processes specially adapted for the manufacture or treatment of devices or of parts thereof (multistep processes [H01L 51/0098](#), [H01L 51/05](#), [H01L 51/42](#), [H01L 51/50](#))}
- 51/0002 . . {Deposition of organic semiconductor materials on a substrate}
- 51/0003 . . . {using liquid deposition, e.g. spin coating}
- 51/0004 {using printing techniques, e.g. ink-jet printing, screen printing}
- 51/0005 {ink-jet printing}
- 51/0006 {Electrolytic deposition using an external electrical current, e.g. in-situ electropolymerisation}
- 51/0007 {characterised by the solvent}
- 51/0008 . . . {using physical deposition, e.g. sublimation, sputtering}
- 51/0009 {using laser ablation}
- 51/001 {Vacuum deposition}
- 51/0011 {selective deposition, e.g. using a mask}
- 51/0012 . . . {special provisions for the orientation or alignment of the layer to be deposited}
- 51/0013 . . . {using non liquid printing techniques, e.g. thermal transfer printing from a donor sheet}
- 51/0014 . . {for changing the shape of the device layer, e.g. patterning}
- 51/0015 . . . {by selective transformation of an existing layer}
- 51/0016 . . . {lift off techniques}
- 51/0017 . . . {etching of an existing layer}
- 51/0018 {using photolithographic techniques}
- 51/0019 {using printing techniques, e.g. applying the etch liquid using an ink jet printer}
- 51/002 . . {Making n- or p-doped regions}
- 51/0021 . . {Formation of conductors}
- 51/0022 . . . {using printing techniques, e.g. ink jet printing}
- 51/0023 . . . {Patterning of conductive layers}
- 51/0024 . . {for forming devices by joining two substrates together, e.g. lamination technique}
- 51/0025 . . {Purification process of the organic semiconductor material}

- 51/0026 . . {Thermal treatment of the active layer, e.g. annealing}
- 51/0027 . . . {using coherent electromagnetic radiation, e.g. laser annealing}
- 51/0028 . . . {Thermal treatment in the presence of solvent vapors, e.g. solvent annealing}
- 51/0029 . . {Special provisions for controlling the atmosphere during processing ([H01L 51/0026](#) takes precedence)}
- 51/003 . . {using a temporary substrate}
- 51/0031 . . {Testing, e.g. accelerated lifetime tests of photoelectric devices}
- 51/0032 . {Selection of organic semiconducting materials, e.g. organic light sensitive or organic light emitting materials}

NOTE

This group only covers the selection of organic materials for their electrical or other properties insofar as they are specific for their use in devices covered by the group [H01L 51/00](#).

For the materials *per se*, see the relevant subclasses.

Attention is drawn to the following places:

- organic materials in general [C07C](#), [C07D](#), [C07F](#), [C08L](#);
- organic materials as electrical conductors [H01B 1/12](#);
- organic materials as electrical insulators [H01B 3/18](#)

- 51/0034 . . {Organic polymers or oligomers (organic macromolecular compounds or compositions *per se* [C08](#))}
- 51/0035 . . . {comprising aromatic, heteroaromatic, or aryl chains, e.g. polyaniline (*per se* [C08G 73/026](#)), polyphenylene (*per se* [C08G 61/10](#)), polyphenylene vinylene (*per se* [C08G 61/02](#))}
- 51/0036 {Heteroaromatic compounds comprising sulfur or selen, e.g. polythiophene (*per se* [C08G 61/126](#))}
- 51/0037 {Polyethylene dioxythiophene [PEDOT] and derivatives}
- 51/0038 {Poly-phenylenevinylene and derivatives (*per se* [C08G 61/10](#))}
- 51/0039 {Polyfluorene and derivatives}
- 51/004 . . . {comprising aliphatic or olefinic chains, e.g. poly N-vinylcarbazol, PVC, PTFE}
- 51/0041 {Poly acetylene (*per se* [C08G 61/04](#), [C08F 38/02](#), [C08F 138/02](#), [C08F 238/02](#)) or derivatives}
- 51/0042 {poly N-vinylcarbazol and derivatives}
- 51/0043 . . . {Copolymers}
- 51/0044 . . . {Ladder-type polymers}
- 51/0045 . . {Carbon containing materials, e.g. carbon nanotubes, fullerenes (*per se* [C01B 32/15](#))}
- 51/0046 . . . {Fullerenes, e.g. C₆₀, C₇₀}
- 51/0047 {comprising substituents, e.g. PCBM}
- 51/0048 {Carbon nanotubes}
- 51/0049 {comprising substituents}
- 51/005 . . {Macromolecular systems with low molecular weight, e.g. cyanine dyes, coumarine dyes, tetrathiafulvalene ([H01L 51/0045](#), [H01L 51/0077](#), [H01L 51/0093](#), [H01L 51/0094](#) take precedence)}

- 51/0051 . . . {Charge transfer complexes}
- 51/0052 . . . {Polycyclic condensed aromatic hydrocarbons, e.g. anthracene}
- 51/0053 {Aromatic anhydride or imide compounds, e.g. perylene tetra-carboxylic dianhydride, perylene tetracarboxylic diimide}
- 51/0054 {containing four rings, e.g. pyrene}
- 51/0055 {containing five rings, e.g. pentacene}
- 51/0056 {containing six or more rings}
- 51/0057 {containing at least one aromatic ring having 7 or more carbon atoms, e.g. azulene}
- 51/0058 {containing more than one polycyclic condensed aromatic rings, e.g. bis-anthracene}
- 51/0059 . . . {Amine compounds having at least two aryl rest on at least one amine-nitrogen atom, e.g. triphenylamine ([per se C07C 211/00](#))}
- 51/006 {comprising polycyclic condensed aromatic hydrocarbons as substituents on the nitrogen atom}
- 51/0061 {comprising heteroaromatic hydrocarbons as substituents on the nitrogen atom}
- 51/0062 . . . {aromatic compounds comprising a hetero atom, e.g.: N,P,S}
- 51/0064 {Cyanine Dyes}
- 51/0065 {comprising only oxygen as heteroatom}
- 51/0067 {comprising only nitrogen as heteroatom ([H01L 51/0064 takes precedence](#))}
- 51/0068 {comprising only sulfur as heteroatom}
- 51/0069 {comprising two or more different heteroatoms per ring, e.g. S and N ([H01L 51/0064 takes precedence](#))}
- 51/007 {Oxadiazole compounds}
- 51/0071 {Polycyclic condensed heteroaromatic hydrocarbons}
- 51/0072 {comprising only nitrogen in the heteroaromatic polycondensed ringsystem, e.g. phenanthroline, carbazole}
- 51/0073 {comprising only oxygen in the heteroaromatic polycondensed ringsystem, e.g. cumarine dyes}
- 51/0074 {comprising only sulfur in the heteroaromatic polycondensed ringsystem, e.g. benzothiophene}
- 51/0075 . . {Langmuir Blodgett films ([per se B05D 1/202](#))}
- 51/0076 . . {Liquid crystalline materials ([per se C09K 19/00](#))}
- 51/0077 . . {Coordination compounds, e.g. porphyrin}
- 51/0078 . . . {Phthalocyanine ([per se C09B 47/04](#))}
- 51/0079 . . . {Metal complexes comprising a IIIB-metal (B, Al, Ga, In or Tl), e.g. Tris (8-hydroxyquinoline) gallium (Gaq3)}
- 51/008 {comprising boron}
- 51/0081 {comprising aluminium, e.g. Alq3}
- 51/0082 {comprising gallium}
- 51/0083 . . . {Metal complexes comprising an iron-series metal, e.g. Fe, Co, Ni}
- 51/0084 . . . {Transition metal complexes, e.g. Ru(II)polypyridine complexes}
- 51/0085 {comprising Iridium}
- 51/0086 {comprising Ruthenium}
- 51/0087 {comprising platinum}
- 51/0088 {comprising osmium}
- 51/0089 . . . {Metal complexes comprising Lanthanides or Actinides, e.g. Eu}
- 51/009 . . . {Polynuclear complexes, i.e. complexes having two or more metal centers}
- 51/0091 . . . {Metal complexes comprising a IB-metal (Cu, Ag, Au)}
- 51/0092 . . . {Metal complexes comprising a IIB-metal (Zn, Cd, Hg)}
- 51/0093 . . {Biomolecules or bio-macromolecules, e.g. proteins, ATP, chlorophyll, beta-carotene, lipids, enzymes}
- 51/0094 . . {Silicon-containing organic semiconductors}
- 51/0095 . . {Starburst compounds}
- 51/0096 . {Substrates}
- 51/0097 . . {flexible substrates}
- 51/0098 . {Molecular electronic devices ([molecular computers G06F 15/80; molecular memories G11C 11/00, G11C 13/02](#))}
- 51/05 . specially adapted for rectifying, amplifying, oscillating or switching, or capacitors or resistors with at least one potential- jump barrier or surface barrier {multistep processes for their manufacture}
- 51/0504 . . {the devices being controllable only by the electric current supplied or the electric potential applied, to an electrode which does not carry the current to be rectified, amplified or switched, e.g. three-terminal devices}
- 51/0508 . . . {Field-effect devices, e.g. TFTs}
- 51/0512 {insulated gate field effect transistors}
- 51/0516 {characterised by the gate dielectric}
- 51/052 {the gate dielectric comprising only organic materials}
- 51/0525 {the gate dielectric comprising only inorganic materials}
- 51/0529 {the gate dielectric having a multilayered structure}
- 51/0533 {Combinations of organic and inorganic layers}
- 51/0537 {the gate dielectric comprising composite materials, e.g. TiO₂ particles in a polymer matrix}
- 51/0541 {Lateral single gate single channel transistors with non inverted structure, i.e. the organic semiconductor layer is formed before the gate electrode}
- 51/0545 {Lateral single gate single channel transistors with inverted structure, i.e. the organic semiconductor layer is formed after the gate electrode}
- 51/055 {characterised by the gate conductor}
- 51/0554 {the transistor having two or more gate electrodes}
- 51/0558 {characterised by the channel of the transistor}
- 51/0562 {the channel comprising two or more active layers, e.g. forming pn - hetero junction}
- 51/0566 {the channel comprising a composite layer, e.g. a mixture of donor and acceptor moieties, forming pn - bulk hetero junction}
- 51/057 {having a vertical structure, e.g. vertical carbon nanotube field effect transistors [CNT-FETs]}

- 51/0575 . . {the devices being controllable only by variation of the electric current supplied or the electric potential applied, to one or more of the electrodes carrying the current to be rectified, amplified, oscillated or switched, e.g. two-terminal devices}
- 51/0579 . . . {Schottky diodes}
- 51/0583 . . . {comprising an organic/organic junction, e.g. hetero-junction}
- 51/0587 . . . {comprising an organic/inorganic hetero-junction, e.g. hetero-junction}
- 51/0591 . . . {Bi-stable switching devices}
- 51/0595 . . . {molecular electronic devices ([molecular computers G06F 15/80](#); [molecular memories G11C 11/00, G11C 13/02](#))}
- 51/10 . . Details of devices
- 51/102 . . . {Electrodes}
- 51/105 {Ohmic contacts, e.g. source and drain electrodes}
- 51/107 . . . {Passivation, containers, encapsulations}
- 51/42 . . specially adapted for sensing infra-red radiation, light, electro-magnetic radiation of shorter wavelength or corpuscular radiation and adapted for the conversion of the energy of such radiation into electrical energy or for the control of electrical energy by such radiation {using organic materials as the active part, or using a combination of organic materials with other material as the active part; Multistep processes for their manufacture}
- 51/4206 . . {Metal-organic semiconductor-metal devices}
- 51/4213 . . {Comprising organic semiconductor-inorganic semiconductor hetero-junctions ([H01L 51/4253 takes precedence](#))}
- 51/422 . . . {Majority carrier devices using sensitisation of widebandgap semiconductors, e.g. TiO₂ ([photoelectrochemical devices with a liquid or solid electrolyte H01G 9/20](#))}
- 51/4226 {the wideband gap semiconductor comprising titanium oxide, e.g. TiO₂}
- 51/4233 {the wideband gap semiconductor comprising zinc oxide, e.g. ZnO}
- 51/424 . . {comprising organic semiconductor-organic semiconductor hetero-junctions ([H01L 51/4253 takes precedence](#))}
- 51/4246 . . . {comprising multi-junctions, e.g. double hetero-junctions}
- 51/4253 . . {comprising bulk hetero-junctions, e.g. interpenetrating networks}
- 51/426 . . . {comprising inorganic nanostructures, e.g. CdSe nanoparticles}
- 51/4266 {the inorganic nanostructures being nanotubes or nanowires, e.g. CdTe nanotubes in P3HT}
- 51/4273 . . . {comprising blocking layers, e.g. exciton blocking layers}
- 51/428 . . {light sensitive field effect devices}
- 51/4286 . . {Devices having a m-i-s structure}
- 51/4293 . . {Devices having a p-i-n structure}
- 51/44 . . Details of devices
- 51/441 . . . {Electrodes}
- 51/442 {transparent electrodes, e.g. ITO, TCO}
- 51/444 {comprising carbon nanotubes}
- 51/445 {comprising arrangements for extracting the current from the cell, e.g. metal finger grid systems to reduce the serial resistance of transparent electrodes}
- 51/447 . . . {Light trapping means}
- 51/448 . . . {Passivation, containers, encapsulations}
- 51/50 . . specially adapted for light emission, e.g. organic light emitting diodes [OLED] or polymer light emitting devices [PLED] ([organic semiconductor lasers H01S 5/36](#) ; [circuit arrangements for OLED or PLED H05B 45/60](#); [control arrangements for organic electroluminescent displays G09G 3/3208](#))
- 51/5004 . . {characterised by the interrelation between parameters of constituting active layers, e.g. HOMO-LUMO relation}
- 51/5008 . . {Intermediate layers comprising a mixture of materials of the adjoining active layers}
- 51/5012 . . {Electroluminescent [EL] layer}
- 51/5016 . . . {Triplet emission}
- 51/502 . . . {comprising active inorganic nanostructures, e.g. luminescent quantum dots}
- 51/5024 . . . {having a host comprising an emissive dopant and further additive materials, e.g. for improving the dispersability, for improving the stabilisation, for assisting energy transfer}
- 51/5028 {for assisting energy transfer, e.g. sensitization}
- 51/5032 . . . {Light emitting electrochemical cells [LEC], i.e. with mobile ions in the active layer}
- 51/5036 . . . {Multi-colour light emission, e.g. colour tuning, polymer blend, stack of electroluminescent layers}
- 51/504 {Stack of electroluminescent layers}
- 51/5044 {with spacer layers between the emissive layers}
- 51/5048 . . {Carrier transporting layer}
- 51/5056 . . . {Hole transporting layer}
- 51/506 {comprising a dopant}
- 51/5064 {having a multilayered structure}
- 51/5068 {arranged between the light emitting layer and the cathode}
- 51/5072 . . . {Electron transporting layer}
- 51/5076 {comprising a dopant}
- 51/508 {having a multilayered structure}
- 51/5084 {arranged between the light emitting layer and the anode}
- 51/5088 . . {Carrier injection layer}
- 51/5092 . . . {Electron injection layer}
- 51/5096 . . {Carrier blocking layer}
- 51/52 . . Details of devices
- 51/5203 . . . {Electrodes}
- 51/5206 {Anodes, i.e. with high work-function material}
- 51/5209 {characterised by the shape}
- 51/5212 {combined with auxiliary electrode, e.g. ITO layer combined with metal lines}
- 51/5215 {composed of transparent multilayers}
- 51/5218 {Reflective anodes, e.g. ITO combined with thick metallic layer}
- 51/5221 {Cathodes, i.e. with low work-function material}
- 51/5225 {characterised by the shape}
- 51/5228 {combined with auxiliary electrodes}

51/5231	. . . . . {composed of opaque multilayers}	2221/1063	. . . . . Sacrificial or temporary thin dielectric films in openings in a dielectric
51/5234	. . . . . {Transparent, e.g. including thin metal film}	2221/1068	. . . Formation and after-treatment of conductors
51/5237	. . . {Passivation; Containers; Encapsulation, e.g. against humidity}	2221/1073	. . . Barrier, adhesion or liner layers
51/524	. . . . . {Sealing arrangements having a self-supporting structure, e.g. containers}	2221/1078	. . . . . Multiple stacked thin films not being formed in openings in dielectrics
51/5243	. . . . . {the sealing arrangements being made of metallic material}	2221/1084	. . . . . Layers specifically deposited to enhance or enable the nucleation of further layers, i.e. seed layers
51/5246	. . . . . {characterised by the peripheral sealing arrangements, e.g. adhesives, sealants}	2221/1089	. . . . . Stacks of seed layers
51/525	. . . . . {Vertical spacers, e.g. arranged between the sealing arrangement and the OLED}	2221/1094	. . . Conducting structures comprising nanotubes or nanowires
51/5253	. . . . . {Protective coatings}	2221/67	. Apparatus for handling semiconductor or electric solid state devices during manufacture or treatment thereof; Apparatus for handling wafers during manufacture or treatment of semiconductor or electric solid state devices or components; Apparatus not specifically provided for elsewhere
51/5256	. . . . . {having repetitive multilayer structures}	2221/683	. . . for supporting or gripping
51/5259	. . . . . {including getter material or desiccant}	2221/68304	. . . using temporarily an auxiliary support
51/5262	. . . {Arrangements for extracting light from the device}	2221/68309	. . . . . Auxiliary support including alignment aids
51/5265	. . . . . {comprising a resonant cavity structure, e.g. Bragg reflector pair}	2221/68313	. . . . . Auxiliary support including a cavity for storing a finished device, e.g. IC package, or a partly finished device, e.g. die, during manufacturing or mounting
51/5268	. . . . . {Scattering means}	2221/68318	. . . . . Auxiliary support including means facilitating the separation of a device or wafer from the auxiliary support
51/5271	. . . . . {Reflective means}	2221/68322	. . . . . Auxiliary support including means facilitating the selective separation of some of a plurality of devices from the auxiliary support
51/5275	. . . . . {Refractive means, e.g. lens}	2221/68327	. . . . . used during dicing or grinding
51/5278	. . . . . {comprising a repetitive electroluminescent unit between one set of electrodes}	2221/68331	. . . . . of passive members, e.g. die mounting substrate
51/5281	. . . {Arrangements for contrast improvement, e.g. preventing reflection of ambient light}	2221/68336	. . . . . involving stretching of the auxiliary support post dicing
51/5284	. . . . . {comprising a light absorbing layer, e.g. black layer}	2221/6834	. . . . . used to protect an active side of a device or wafer
51/5287	. . . {OLED having a fiber structure}	2221/68345	. . . . . used as a support during the manufacture of self supporting substrates
51/529	. . . {Arrangements for heating or cooling}	2221/6835	. . . . . used as a support during build up manufacturing of active devices
51/5293	. . . {Arrangements for polarized light emission (H01L 51/5281 takes precedence)}	2221/68354	. . . . . used to support diced chips prior to mounting
51/5296	. . . {Light emitting organic transistors}	2221/68359	. . . . . used as a support during manufacture of interconnect decals or build up layers
51/56	. . Processes or apparatus specially adapted for the manufacture or treatment of such devices or of parts thereof	2221/68363	. . . . . used in a transfer process involving transfer directly from an origin substrate to a target substrate without use of an intermediate handle substrate
2221/00	Processes or apparatus adapted for the manufacture or treatment of semiconductor or solid state devices or of parts thereof covered by H01L 21/00	2221/68368	. . . . . used in a transfer process involving at least two transfer steps, i.e. including an intermediate handle substrate
2221/10	. Applying interconnections to be used for carrying current between separate components within a device	2221/68372	. . . . . used to support a device or wafer when forming electrical connections thereto (when forming bonding pads H01L 24/03; when forming bump connectors H01L 24/11; when forming layer connectors H01L 24/27)
2221/1005	. . Formation and after-treatment of dielectrics	2221/68377	. . . . . with parts of the auxiliary support remaining in the finished device
2221/101	. . . Forming openings in dielectrics	2221/68381	. . . . . Details of chemical or physical process used for separating the auxiliary support from a device or wafer
2221/1015	. . . . . for dual damascene structures	2221/68386	. . . . . Separation by peeling
2221/1021	. . . . . Pre-forming the dual damascene structure in a resist layer		
2221/1026	. . . . . the via being formed by burying a sacrificial pillar in the dielectric and removing the pillar		
2221/1031	. . . . . Dual damascene by forming vias in the via-level dielectric prior to deposition of the trench-level dielectric		
2221/1036	. . . . . Dual damascene with different via-level and trench-level dielectrics		
2221/1042	. . . the dielectric comprising air gaps		
2221/1047	. . . the air gaps being formed by pores in the dielectric		
2221/1052	. . . Formation of thin functional dielectric layers		
2221/1057	. . . . . in via holes or trenches		

2221/6839	. . . . . using peeling wedge or knife or bar	2224/00	Indexing scheme for arrangements for connecting or disconnecting semiconductor or solid-state bodies and methods related thereto as covered by H01L 24/00
2221/68395	. . . . . using peeling wheel	2224/01	. Means for bonding being attached to, or being formed on, the surface to be connected, e.g. chip-to-package, die-attach, "first-level" interconnects; Manufacturing methods related thereto
2223/00	Details relating to semiconductor or other solid state devices covered by the group H01L 23/00	2224/02	. . Bonding areas; Manufacturing methods related thereto
2223/544	. Marks applied to semiconductor devices or parts	2224/0212	. . . Auxiliary members for bonding areas, e.g. spacers
2223/54406	. . comprising alphanumeric information	2224/02122	. . . . being formed on the semiconductor or solid-state body
2223/54413	. . comprising digital information, e.g. bar codes, data matrix	2224/02123	. . . . . inside the bonding area
2223/5442	. . comprising non digital, non alphanumeric information, e.g. symbols	2224/02125	. . . . . Reinforcing structures
2223/54426	. . for alignment	2224/02126	. . . . . Collar structures
2223/54433	. . containing identification or tracking information	2224/0213	. . . . . Alignment aids
2223/5444	. . . for electrical read out	2224/02135	. . . . . Flow barrier
2223/54446	. . . Wireless electrical read out	2224/0214	. . . . . Structure of the auxiliary member
2223/54453	. . for use prior to dicing	2224/02141	. . . . . Multilayer auxiliary member
2223/5446	. . . Located in scribe lines	2224/02145	. . . . . Shape of the auxiliary member
2223/54466	. . . Located in a dummy or reference die	2224/0215	. . . . . Material of the auxiliary member
2223/54473	. . for use after dicing	2224/02163	. . . . . on the bonding area
2223/5448	. . . Located on chip prior to dicing and remaining on chip after dicing	2224/02165	. . . . . Reinforcing structures
2223/54486	. . . Located on package parts, e.g. encapsulation, leads, package substrate	2224/02166	. . . . . Collar structures
2223/54493	. . Peripheral marks on wafers, e.g. orientation flats, notches, lot number	2224/0217	. . . . . Alignment aids
2223/58	. Structural electrical arrangements for semiconductor devices not otherwise provided for	2224/02175	. . . . . Flow barrier
2223/64	. . Impedance arrangements	2224/0218	. . . . . Structure of the auxiliary member
2223/66	. . . High-frequency adaptations	2224/02181	. . . . . Multilayer auxiliary member
2223/6605	. . . . High-frequency electrical connections	2224/02185	. . . . . Shape of the auxiliary member
2223/6611	. . . . . Wire connections	2224/0219	. . . . . Material of the auxiliary member
2223/6616	. . . . . Vertical connections, e.g. vias	2224/022	. . . . . Protective coating, i.e. protective bond-through coating
2223/6622	. . . . . Coaxial feed-throughs in active or passive substrates	2224/02205	. . . . . Structure of the protective coating
2223/6627	. . . . . Waveguides, e.g. microstrip line, strip line, coplanar line	2224/02206	. . . . . Multilayer protective coating
2223/6633	. . . . . Transition between different waveguide types	2224/0221	. . . . . Shape of the protective coating
2223/6638	. . . . . Differential pair signal lines	2224/02215	. . . . . Material of the protective coating
2223/6644	. . . . Packaging aspects of high-frequency amplifiers (amplifiers per se H03F)	2224/02233	. . . . . not in direct contact with the bonding area
2223/665	. . . . . Bias feed arrangements	2224/02235	. . . . . Reinforcing structures
2223/6655	. . . . . Matching arrangements, e.g. arrangement of inductive and capacitive components	2224/0224	. . . . . Alignment aids
2223/6661	. . . . for passive devices (passive components per se H01L 28/00)	2224/02245	. . . . . Flow barrier
2223/6666	. . . . . for decoupling, e.g. bypass capacitors	2224/0225	. . . . . Structure of the auxiliary member
2223/6672	. . . . . for integrated passive components, e.g. semiconductor device with passive components only (integrated circuits with passive components only per se H01L 27/01)	2224/02251	. . . . . Multilayer auxiliary member
2223/6677	. . . . . for antenna, e.g. antenna included within housing of semiconductor device (antennas per se H01Q)	2224/02255	. . . . . Shape of the auxiliary member
2223/6683	. . . . for monolithic microwave integrated circuit [MMIC]	2224/0226	. . . . . Material of the auxiliary member
2223/6688	. . . . Mixed frequency adaptations, i.e. for operation at different frequencies	2224/023	. . . Redistribution layers [RDL] for bonding areas
2223/6694	. . . . Optical signal interface included within high-frequency semiconductor device housing	2224/0231	. . . . Manufacturing methods of the redistribution layers
		2224/02311	. . . . . Additive methods
		2224/02313	. . . . . Subtractive methods
		2224/02315	. . . . . Self-assembly processes
		2224/02317	. . . . . by local deposition
		2224/02319	. . . . . by using a preform
		2224/02321	. . . . . Reworking
		2224/0233	. . . . Structure of the redistribution layers
		2224/02331	. . . . . Multilayer structure
		2224/02333	. . . . . being a bump
		2224/02335	. . . . . Free-standing redistribution layers
		2224/0235	. . . . Shape of the redistribution layers
		2224/02351	. . . . . comprising interlocking features
		2224/0236	. . . . Shape of the insulating layers therebetween

2224/0237	. . . .	Disposition of the redistribution layers	2224/03436	. . . . .	Lamination of a preform, e.g. foil, sheet or layer
2224/02371	. . . . .	connecting the bonding area on a surface of the semiconductor or solid-state body with another surface of the semiconductor or solid-state body	2224/03438	. . . . .	the preform being at least partly pre-patterned
2224/02372	. . . . .	connecting to a via connection in the semiconductor or solid-state body	2224/0344	. . . . .	by transfer printing
2224/02373	. . . . .	Layout of the redistribution layers	2224/03442	. . . . .	using a powder
2224/02375	. . . . .	Top view	2224/03444	. . . . .	in gaseous form
2224/02377	. . . . .	Fan-in arrangement	2224/0345	. . . . .	Physical vapour deposition [PVD], e.g. evaporation, or sputtering
2224/02379	. . . . .	Fan-out arrangement	2224/03452	. . . . .	Chemical vapour deposition [CVD], e.g. laser CVD
2224/02381	. . . . .	Side view	2224/0346	. . . . .	Plating
2224/0239	. . . . .	Material of the redistribution layers	2224/03462	. . . . .	Electroplating
2224/024	. . . . .	Material of the insulating layers therebetween	2224/03464	. . . . .	Electroless plating
2224/03	. . . .	Manufacturing methods	2224/03466	. . . . .	Conformal deposition, i.e. blanket deposition of a conformal layer on a patterned surface
2224/03001	. . . . .	Involving a temporary auxiliary member not forming part of the manufacturing apparatus, e.g. removable or sacrificial coating, film or substrate	2224/0347	. . . . .	using a lift-off mask
2224/03002	. . . . .	for supporting the semiconductor or solid-state body	2224/03472	. . . . .	Profile of the lift-off mask
2224/03003	. . . . .	for holding or transferring a preform	2224/03474	. . . . .	Multilayer masks
2224/03005	. . . . .	for aligning the bonding area, e.g. marks, spacers	2224/0348	. . . . .	Permanent masks, i.e. masks left in the finished device, e.g. passivation layers
2224/03009	. . . . .	for protecting parts during manufacture	2224/035	. . . . .	by chemical or physical modification of a pre-existing or pre-deposited material
2224/03011	. . . . .	Involving a permanent auxiliary member, i.e. a member which is left at least partly in the finished device, e.g. coating, dummy feature	2224/03502	. . . . .	Pre-existing or pre-deposited material
2224/03013	. . . . .	for holding or confining the bonding area, e.g. solder flow barrier	2224/03505	. . . . .	Sintering
2224/03015	. . . . .	for aligning the bonding area, e.g. marks, spacers	2224/0351	. . . . .	Anodisation
2224/03019	. . . . .	for protecting parts during the process	2224/03515	. . . . .	Curing and solidification, e.g. of a photosensitive material
2224/031	. . . . .	Manufacture and pre-treatment of the bonding area preform	2224/0352	. . . . .	Self-assembly, e.g. self-agglomeration of the material in a fluid
2224/0311	. . . . .	Shaping	2224/03522	. . . . .	Auxiliary means therefor, e.g. for self-assembly activation
2224/0312	. . . . .	Applying permanent coating	2224/03524	. . . . .	with special adaptation of the surface of the body to be connected or of an auxiliary substrate, e.g. surface shape specially adapted for the self-assembly process
2224/033	. . . . .	by local deposition of the material of the bonding area	2224/0355	. . . . .	Selective modification
2224/0331	. . . . .	in liquid form	2224/03552	. . . . .	using a laser or a focussed ion beam [FIB]
2224/03312	. . . . .	Continuous flow, e.g. using a microsyringe, a pump, a nozzle or extrusion	2224/03554	. . . . .	Stereolithography, i.e. solidification of a pattern defined by a laser trace in a photosensitive resin
2224/03318	. . . . .	by dispensing droplets	2224/036	. . . . .	by patterning a pre-deposited material (treatment of parts prior to assembly of the devices H01L 21/48)
2224/0332	. . . . .	Screen printing, i.e. using a stencil	2224/03602	. . . . .	Mechanical treatment, e.g. polishing, grinding
2224/0333	. . . . .	in solid form	2224/0361	. . . . .	Physical or chemical etching
2224/03332	. . . . .	using a powder	2224/03612	. . . . .	by physical means only
2224/03334	. . . . .	using a preform	2224/03614	. . . . .	by chemical means only
2224/034	. . . . .	by blanket deposition of the material of the bonding area	2224/03616	. . . . .	Chemical mechanical polishing [CMP]
2224/0341	. . . . .	in liquid form	2224/03618	. . . . .	with selective exposure, development and removal of a photosensitive material, e.g. of a photosensitive conductive resin
2224/03416	. . . . .	Spin coating	2224/0362	. . . . .	Photolithography
2224/03418	. . . . .	Spray coating	2224/03622	. . . . .	using masks
2224/0342	. . . . .	Curtain coating	2224/0363	. . . . .	using a laser or a focused ion beam [FIB]
2224/03422	. . . . .	by dipping, e.g. in a solder bath (hot-dipping C23C 2/00)	2224/03632	. . . . .	Ablation by means of a laser or focused ion beam [FIB]
2224/03424	. . . . .	Immersion coating, e.g. in a solder bath (immersion processes C23C 2/00)	2224/037	. . . . .	involving monitoring, e.g. feedback loop
2224/03426	. . . . .	Chemical solution deposition [CSD], i.e. using a liquid precursor	2224/038	. . . . .	Post-treatment of the bonding area
2224/03428	. . . . .	Wave coating			
2224/0343	. . . . .	in solid form			

2224/0381	. . . . .	Cleaning, e.g. oxide removal step, desmearing	2224/04105	. . . . .	Bonding areas formed on an encapsulation of the semiconductor or solid-state body, e.g. bonding areas on chip-scale packages
2224/0382	. . . . .	Applying permanent coating, e.g. in-situ coating	2224/05	. . . . .	of an individual bonding area
2224/03821	. . . . .	Spray coating	2224/05001	. . . . .	Internal layers
2224/03822	. . . . .	by dipping, e.g. in a solder bath	2224/05005	. . . . .	Structure
2224/03823	. . . . .	Immersion coating, e.g. in a solder bath	2224/05006	. . . . .	Dual damascene structure
2224/03824	. . . . .	Chemical solution deposition [CSD], i.e. using a liquid precursor	2224/05007	. . . . .	comprising a core and a coating
2224/03825	. . . . .	Plating, e.g. electroplating, electroless plating	2224/05008	. . . . .	Bonding area integrally formed with a redistribution layer on the semiconductor or solid-state body, e.g.
2224/03826	. . . . .	Physical vapour deposition [PVD], e.g. evaporation, or sputtering	2224/05009	. . . . .	Bonding area integrally formed with a via connection of the semiconductor or solid-state body
2224/03827	. . . . .	Chemical vapour deposition [CVD], e.g. laser CVD	2224/0501	. . . . .	Shape
2224/03828	. . . . .	Applying flux	2224/05011	. . . . .	comprising apertures or cavities
2224/03829	. . . . .	Applying a precursor material	2224/05012	. . . . .	in top view
2224/0383	. . . . .	Reworking, e.g. shaping (reflowing H01L 2224/03849)	2224/05013	. . . . .	being rectangular
2224/03831	. . . . .	involving a chemical process, e.g. etching the bonding area	2224/05014	. . . . .	being square
2224/0384	. . . . .	involving a mechanical process, e.g. planarising the bonding area	2224/05015	. . . . .	being circular or elliptic
2224/03845	. . . . .	Chemical mechanical polishing [CMP]	2224/05016	. . . . .	in side view
2224/03848	. . . . .	Thermal treatments, e.g. annealing, controlled cooling	2224/05017	. . . . .	comprising protrusions or indentations
2224/03849	. . . . .	Reflowing	2224/05018	. . . . .	being a conformal layer on a patterned surface
2224/039	. . . . .	Methods of manufacturing bonding areas involving a specific sequence of method steps	2224/05019	. . . . .	being a non conformal layer on a patterned surface
2224/03901	. . . . .	with repetition of the same manufacturing step	2224/0502	. . . . .	Disposition
2224/03902	. . . . .	Multiple masking steps	2224/05022	. . . . .	the internal layer being at least partially embedded in the surface
2224/03903	. . . . .	using different masks	2224/05023	. . . . .	the whole internal layer protruding from the surface
2224/03906	. . . . .	with modification of the same mask	2224/05024	. . . . .	the internal layer being disposed on a redistribution layer on the semiconductor or solid-state body
2224/0391	. . . . .	Forming a passivation layer after forming the bonding area	2224/05025	. . . . .	the internal layer being disposed on a via connection of the semiconductor or solid-state body
2224/03912	. . . . .	the bump being used as a mask for patterning the bonding area	2224/05026	. . . . .	the internal layer being disposed in a recess of the surface
2224/03914	. . . . .	the bonding area, e.g. under bump metallisation [UBM], being used as a mask for patterning other parts	2224/05027	. . . . .	the internal layer extending out of an opening
2224/03916	. . . . .	a passivation layer being used as a mask for patterning the bonding area	2224/05073	. . . . .	Single internal layer
2224/0392	. . . . .	specifically adapted to include a probing step	2224/05075	. . . . .	Plural internal layers
2224/03921	. . . . .	by repairing the bonding area damaged by the probing step	2224/05076	. . . . .	being mutually engaged together, e.g. through inserts
2224/04	. . . . .	Structure, shape, material or disposition of the bonding areas prior to the connecting process	2224/05078	. . . . .	being disposed next to each other, e.g. side-to-side arrangements
2224/0401	. . . . .	Bonding areas specifically adapted for bump connectors, e.g. under bump metallisation [UBM]	2224/0508	. . . . .	being stacked
2224/04026	. . . . .	Bonding areas specifically adapted for layer connectors	2224/05082	. . . . .	Two-layer arrangements
2224/04034	. . . . .	Bonding areas specifically adapted for strap connectors	2224/05083	. . . . .	Three-layer arrangements
2224/04042	. . . . .	Bonding areas specifically adapted for wire connectors, e.g. wirebond pads	2224/05084	. . . . .	Four-layer arrangements
2224/0405	. . . . .	Bonding areas specifically adapted for tape automated bonding [TAB] connectors	2224/05085	. . . . .	with additional elements, e.g. vias arrays, interposed between the stacked layers
2224/04073	. . . . .	Bonding areas specifically adapted for connectors of different types	2224/05086	. . . . .	Structure of the additional element
			2224/05087	. . . . .	being a via with at least a lining layer
			2224/05088	. . . . .	Shape of the additional element
			2224/05089	. . . . .	Disposition of the additional element

2224/0509	of a single via	2224/05164	Palladium [Pd] as principal constituent
2224/05091	at the center of the internal layers	2224/05166	Titanium [Ti] as principal constituent
2224/05092	at the periphery of the internal layers	2224/05169	Platinum [Pt] as principal constituent
2224/05093	of a plurality of vias	2224/0517	Zirconium [Zr] as principal constituent
2224/05094	at the center of the internal layers	2224/05171	Chromium [Cr] as principal constituent
2224/05095	at the periphery of the internal layers	2224/05172	Vanadium [V] as principal constituent
2224/05096	Uniform arrangement, i.e. array	2224/05173	Rhodium [Rh] as principal constituent
2224/05097	Random arrangement	2224/05176	Ruthenium [Ru] as principal constituent
2224/05098	Material of the additional element	2224/05178	Iridium [Ir] as principal constituent
2224/05099	Material	2224/05179	Niobium [Nb] as principal constituent
2224/051	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/0518	Molybdenum [Mo] as principal constituent
2224/05101	the principal constituent melting at a temperature of less than 400°C	2224/05181	Tantalum [Ta] as principal constituent
2224/05105	Gallium [Ga] as principal constituent	2224/05183	Rhenium [Re] as principal constituent
2224/05109	Indium [In] as principal constituent	2224/05184	Tungsten [W] as principal constituent
2224/05111	Tin [Sn] as principal constituent	2224/05186	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/05113	Bismuth [Bi] as principal constituent	2224/05187	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/05188)
2224/05114	Thallium [Tl] as principal constituent	2224/05188	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/05116	Lead [Pb] as principal constituent	2224/0519	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/05117	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/05191	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/05118	Zinc [Zn] as principal constituent	2224/05193	with a principal constituent of the material being a solid not provided for in groups H01L 2224/051 - H01L 2224/05191 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/0512	Antimony [Sb] as principal constituent	2224/05194	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/051 - H01L 2224/05191
2224/05123	Magnesium [Mg] as principal constituent	2224/05195	with a principal constituent of the material being a gas not provided for in groups H01L 2224/051 - H01L 2224/05191
2224/05124	Aluminium [Al] as principal constituent	2224/05198	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/05138	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/05199	Material of the matrix
2224/05139	Silver [Ag] as principal constituent		
2224/05144	Gold [Au] as principal constituent		
2224/05147	Copper [Cu] as principal constituent		
2224/05149	Manganese [Mn] as principal constituent		
2224/05155	Nickel [Ni] as principal constituent		
2224/05157	Cobalt [Co] as principal constituent		
2224/0516	Iron [Fe] as principal constituent		
2224/05163	the principal constituent melting at a temperature of greater than 1550°C		

2224/052	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/05271	Chromium [Cr] as principal constituent
2224/05201	the principal constituent melting at a temperature of less than 400°C	2224/05272	Vanadium [V] as principal constituent
2224/05205	Gallium [Ga] as principal constituent	2224/05273	Rhodium [Rh] as principal constituent
2224/05209	Indium [In] as principal constituent	2224/05276	Ruthenium [Ru] as principal constituent
2224/05211	Tin [Sn] as principal constituent	2224/05278	Iridium [Ir] as principal constituent
2224/05213	Bismuth [Bi] as principal constituent	2224/05279	Niobium [Nb] as principal constituent
2224/05214	Thallium [Tl] as principal constituent	2224/0528	Molybdenum [Mo] as principal constituent
2224/05216	Lead [Pb] as principal constituent	2224/05281	Tantalum [Ta] as principal constituent
2224/05217	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/05283	Rhenium [Re] as principal constituent
2224/05218	Zinc [Zn] as principal constituent	2224/05284	Tungsten [W] as principal constituent
2224/0522	Antimony [Sb] as principal constituent	2224/05286	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/05223	Magnesium [Mg] as principal constituent	2224/05287	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/05288)
2224/05224	Aluminium [Al] as principal constituent	2224/05288	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/05238	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/0529	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/05239	Silver [Ag] as principal constituent	2224/05291	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/05244	Gold [Au] as principal constituent	2224/05293	with a principal constituent of the material being a solid not provided for in groups H01L 2224/052 - H01L 2224/05291 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/05247	Copper [Cu] as principal constituent	2224/05294	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/052 - H01L 2224/05291
2224/05249	Manganese [Mn] as principal constituent	2224/05295	with a principal constituent of the material being a gas not provided for in groups H01L 2224/052 - H01L 2224/05291
2224/05255	Nickel [Ni] as principal constituent	2224/05298	Fillers
2224/05257	Cobalt [Co] as principal constituent	2224/05299	Base material
2224/0526	Iron [Fe] as principal constituent	2224/053	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/05263	the principal constituent melting at a temperature of greater than 1550°C	2224/05301	the principal constituent melting at a temperature of less than 400°C
2224/05264	Palladium [Pd] as principal constituent	2224/05305	Gallium [Ga] as principal constituent
2224/05266	Titanium [Ti] as principal constituent		
2224/05269	Platinum [Pt] as principal constituent		
2224/0527	Zirconium [Zr] as principal constituent		

2224/05309	Indium [In] as principal constituent	2224/0538	Molybdenum [Mo] as principal constituent
2224/05311	Tin [Sn] as principal constituent	2224/05381	Tantalum [Ta] as principal constituent
2224/05313	Bismuth [Bi] as principal constituent	2224/05383	Rhenium [Re] as principal constituent
2224/05314	Thallium [Tl] as principal constituent	2224/05384	Tungsten [W] as principal constituent
2224/05316	Lead [Pb] as principal constituent	2224/05386	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/05317	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/05387	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/05388)
2224/05318	Zinc [Zn] as principal constituent	2224/05388	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/0532	Antimony [Sb] as principal constituent	2224/0539	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/05323	Magnesium [Mg] as principal constituent	2224/05391	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/05324	Aluminium [Al] as principal constituent	2224/05393	with a principal constituent of the material being a solid not provided for in groups H01L 2224/053 - H01L 2224/05391 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/05338	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/05394	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/053 - H01L 2224/05391
2224/05339	Silver [Ag] as principal constituent	2224/05395	with a principal constituent of the material being a gas not provided for in groups H01L 2224/053 - H01L 2224/05391
2224/05344	Gold [Au] as principal constituent	2224/05398	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/05347	Copper [Cu] as principal constituent	2224/05399	Coating material
2224/05349	Manganese [Mn] as principal constituent	2224/054	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/05355	Nickel [Ni] as principal constituent	2224/05401	the principal constituent melting at a temperature of less than 400°C
2224/05357	Cobalt [Co] as principal constituent	2224/05405	Gallium [Ga] as principal constituent
2224/0536	Iron [Fe] as principal constituent	2224/05409	Indium [In] as principal constituent
2224/05363	the principal constituent melting at a temperature of greater than 1550°C	2224/05411	Tin [Sn] as principal constituent
2224/05364	Palladium [Pd] as principal constituent		
2224/05366	Titanium [Ti] as principal constituent		
2224/05369	Platinum [Pt] as principal constituent		
2224/0537	Zirconium [Zr] as principal constituent		
2224/05371	Chromium [Cr] as principal constituent		
2224/05372	Vanadium [V] as principal constituent		
2224/05373	Rhodium [Rh] as principal constituent		
2224/05376	Ruthenium [Ru] as principal constituent		
2224/05378	Iridium [Ir] as principal constituent		
2224/05379	Niobium [Nb] as principal constituent		

2224/05413	Bismuth [Bi] as principal constituent	2224/05483	Rhenium [Re] as principal constituent
2224/05414	Thallium [Tl] as principal constituent	2224/05484	Tungsten [W] as principal constituent
2224/05416	Lead [Pb] as principal constituent	2224/05486	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/05417	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/05487	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/05488)
2224/05418	Zinc [Zn] as principal constituent	2224/05488	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/0542	Antimony [Sb] as principal constituent	2224/0549	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/05423	Magnesium [Mg] as principal constituent	2224/05491	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/05424	Aluminium [Al] as principal constituent	2224/05493	with a principal constituent of the material being a solid not provided for in groups H01L 2224/054 - H01L 2224/05491 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/05438	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/05494	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/054 - H01L 2224/05491
2224/05439	Silver [Ag] as principal constituent	2224/05495	with a principal constituent of the material being a gas not provided for in groups H01L 2224/054 - H01L 2224/05491
2224/05444	Gold [Au] as principal constituent	2224/05498	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/05447	Copper [Cu] as principal constituent	2224/05499	Shape or distribution of the fillers
2224/05449	Manganese [Mn] as principal constituent	2224/0554	External layer
2224/05455	Nickel [Ni] as principal constituent	2224/05541	Structure
2224/05457	Cobalt [Co] as principal constituent	2224/05546	Dual damascene structure
2224/0546	Iron [Fe] as principal constituent	2224/05547	comprising a core and a coating
2224/05463	the principal constituent melting at a temperature of greater than 1550°C	2224/05548	Bonding area integrally formed with a redistribution layer on the semiconductor or solid-state body
2224/05464	Palladium [Pd] as principal constituent	2224/0555	Shape
2224/05466	Titanium [Ti] as principal constituent	2224/05551	comprising apertures or cavities
2224/05469	Platinum [Pt] as principal constituent	2224/05552	in top view
2224/0547	Zirconium [Zr] as principal constituent	2224/05553	being rectangular
2224/05471	Chromium [Cr] as principal constituent	2224/05554	being square
2224/05472	Vanadium [V] as principal constituent	2224/05555	being circular or elliptic
2224/05473	Rhodium [Rh] as principal constituent	2224/05556	in side view
2224/05476	Ruthenium [Ru] as principal constituent	2224/05557	comprising protrusions or indentations
2224/05478	Iridium [Ir] as principal constituent	2224/05558	conformal layer on a patterned surface
2224/05479	Niobium [Nb] as principal constituent	2224/05559	non conformal layer on a patterned surface
2224/0548	Molybdenum [Mo] as principal constituent		
2224/05481	Tantalum [Ta] as principal constituent		

2224/0556	Disposition	2224/05624	Aluminium [Al] as principal constituent
2224/05561	On the entire surface of the internal layer	2224/05638	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/05562	On the entire exposed surface of the internal layer	2224/05639	Silver [Ag] as principal constituent
2224/05563	Only on parts of the surface of the internal layer	2224/05644	Gold [Au] as principal constituent
2224/05564	Only on the bonding interface of the bonding area	2224/05647	Copper [Cu] as principal constituent
2224/05565	Only outside the bonding interface of the bonding area	2224/05649	Manganese [Mn] as principal constituent
2224/05566	Both on and outside the bonding interface of the bonding area	2224/05655	Nickel [Ni] as principal constituent
2224/05567	the external layer being at least partially embedded in the surface	2224/05657	Cobalt [Co] as principal constituent
2224/05568	the whole external layer protruding from the surface	2224/0566	Iron [Fe] as principal constituent
2224/05569	the external layer being disposed on a redistribution layer on the semiconductor or solid-state body	2224/05663	the principal constituent melting at a temperature of greater than 1550°C
2224/0557	the external layer being disposed on a via connection of the semiconductor or solid-state body	2224/05664	Palladium [Pd] as principal constituent
2224/05571	the external layer being disposed in a recess of the surface	2224/05666	Titanium [Ti] as principal constituent
2224/05572	the external layer extending out of an opening	2224/05669	Platinum [Pt] as principal constituent
2224/05573	Single external layer	2224/0567	Zirconium [Zr] as principal constituent
2224/05575	Plural external layers	2224/05671	Chromium [Cr] as principal constituent
2224/05576	being mutually engaged together, e.g. through inserts	2224/05672	Vanadium [V] as principal constituent
2224/05578	being disposed next to each other, e.g. side-to-side arrangements	2224/05673	Rhodium [Rh] as principal constituent
2224/0558	being stacked	2224/05676	Ruthenium [Ru] as principal constituent
2224/05582	Two-layer coating	2224/05678	Iridium [Ir] as principal constituent
2224/05583	Three-layer coating	2224/05679	Niobium [Nb] as principal constituent
2224/05584	Four-layer coating	2224/0568	Molybdenum [Mo] as principal constituent
2224/05599	Material	2224/05681	Tantalum [Ta] as principal constituent
2224/056	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/05683	Rhenium [Re] as principal constituent
2224/05601	the principal constituent melting at a temperature of less than 400°C	2224/05684	Tungsten [W] as principal constituent
2224/05605	Gallium [Ga] as principal constituent	2224/05686	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/05609	Indium [In] as principal constituent	2224/05687	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/05688)
2224/05611	Tin [Sn] as principal constituent	2224/05688	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/05613	Bismuth [Bi] as principal constituent	2224/0569	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/05614	Thallium [Tl] as principal constituent		
2224/05616	Lead [Pb] as principal constituent		
2224/05617	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C		
2224/05618	Zinc [Zn] as principal constituent		
2224/0562	Antimony [Sb] as principal constituent		
2224/05623	Magnesium [Mg] as principal constituent		

2224/05691	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/05744	. . . . .	Gold [Au] as principal constituent
2224/05693	. . . . .	with a principal constituent of the material being a solid not provided for in groups H01L 2224/056 - H01L 2224/05691 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/05747	. . . . .	Copper [Cu] as principal constituent
2224/05694	. . . . .	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/056 - H01L 2224/05691	2224/05749	. . . . .	Manganese [Mn] as principal constituent
2224/05695	. . . . .	with a principal constituent of the material being a gas not provided for in groups H01L 2224/056 - H01L 2224/05691	2224/05755	. . . . .	Nickel [Ni] as principal constituent
2224/05698	. . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/05757	. . . . .	Cobalt [Co] as principal constituent
2224/05699	. . . . .	Material of the matrix	2224/0576	. . . . .	Iron [Fe] as principal constituent
2224/057	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/05763	. . . . .	the principal constituent melting at a temperature of greater than 1550°C
2224/05701	. . . . .	the principal constituent melting at a temperature of less than 400°C	2224/05764	. . . . .	Palladium [Pd] as principal constituent
2224/05705	. . . . .	Gallium [Ga] as principal constituent	2224/05766	. . . . .	Titanium [Ti] as principal constituent
2224/05709	. . . . .	Indium [In] as principal constituent	2224/05769	. . . . .	Platinum [Pt] as principal constituent
2224/05711	. . . . .	Tin [Sn] as principal constituent	2224/0577	. . . . .	Zirconium [Zr] as principal constituent
2224/05713	. . . . .	Bismuth [Bi] as principal constituent	2224/05771	. . . . .	Chromium [Cr] as principal constituent
2224/05714	. . . . .	Thallium [Tl] as principal constituent	2224/05772	. . . . .	Vanadium [V] as principal constituent
2224/05716	. . . . .	Lead [Pb] as principal constituent	2224/05773	. . . . .	Rhodium [Rh] as principal constituent
2224/05717	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/05776	. . . . .	Ruthenium [Ru] as principal constituent
2224/05718	. . . . .	Zinc [Zn] as principal constituent	2224/05778	. . . . .	Iridium [Ir] as principal constituent
2224/0572	. . . . .	Antimony [Sb] as principal constituent	2224/05779	. . . . .	Niobium [Nb] as principal constituent
2224/05723	. . . . .	Magnesium [Mg] as principal constituent	2224/0578	. . . . .	Molybdenum [Mo] as principal constituent
2224/05724	. . . . .	Aluminium [Al] as principal constituent	2224/05781	. . . . .	Tantalum [Ta] as principal constituent
2224/05738	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/05783	. . . . .	Rhenium [Re] as principal constituent
2224/05739	. . . . .	Silver [Ag] as principal constituent	2224/05784	. . . . .	Tungsten [W] as principal constituent
			2224/05786	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
			2224/05787	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/05788)
			2224/05788	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
			2224/0579	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
			2224/05791	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene

2224/05793	with a principal constituent of the material being a solid not provided for in groups H01L 2224/057 - H01L 2224/05791 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/05857	Cobalt [Co] as principal constituent
2224/05794	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/057 - H01L 2224/05791	2224/0586	Iron [Fe] as principal constituent
2224/05795	with a principal constituent of the material being a gas not provided for in groups H01L 2224/057 - H01L 2224/05791	2224/05863	the principal constituent melting at a temperature of greater than 1550°C
2224/05798	Fillers	2224/05864	Palladium [Pd] as principal constituent
2224/05799	Base material	2224/05866	Titanium [Ti] as principal constituent
2224/058	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/05869	Platinum [Pt] as principal constituent
2224/05801	the principal constituent melting at a temperature of less than 400°C	2224/0587	Zirconium [Zr] as principal constituent
2224/05805	Gallium [Ga] as principal constituent	2224/05871	Chromium [Cr] as principal constituent
2224/05809	Indium [In] as principal constituent	2224/05872	Vanadium [V] as principal constituent
2224/05811	Tin [Sn] as principal constituent	2224/05873	Rhodium [Rh] as principal constituent
2224/05813	Bismuth [Bi] as principal constituent	2224/05876	Ruthenium [Ru] as principal constituent
2224/05814	Thallium [Tl] as principal constituent	2224/05878	Iridium [Ir] as principal constituent
2224/05816	Lead [Pb] as principal constituent	2224/05879	Niobium [Nb] as principal constituent
2224/05817	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/0588	Molybdenum [Mo] as principal constituent
2224/05818	Zinc [Zn] as principal constituent	2224/05881	Tantalum [Ta] as principal constituent
2224/0582	Antimony [Sb] as principal constituent	2224/05883	Rhenium [Re] as principal constituent
2224/05823	Magnesium [Mg] as principal constituent	2224/05884	Tungsten [W] as principal constituent
2224/05824	Aluminium [Al] as principal constituent	2224/05886	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/05838	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/05887	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/05888)
2224/05839	Silver [Ag] as principal constituent	2224/05888	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/05844	Gold [Au] as principal constituent	2224/0589	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/05847	Copper [Cu] as principal constituent	2224/05891	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/05849	Manganese [Mn] as principal constituent	2224/05893	with a principal constituent of the material being a solid not provided for in groups H01L 2224/058 - H01L 2224/05891 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/05855	Nickel [Ni] as principal constituent	2224/05894	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/058 - H01L 2224/05891

2224/05895	with a principal constituent of the material being a gas not provided for in groups H01L 2224/058 - H01L 2224/05891	2224/05963	the principal constituent melting at a temperature of greater than 1550°C
2224/05898	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/05964	Palladium [Pd] as principal constituent
2224/05899	Coating material	2224/05966	Titanium [Ti] as principal constituent
2224/059	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/05969	Platinum [Pt] as principal constituent
2224/05901	the principal constituent melting at a temperature of less than 400°C	2224/0597	Zirconium [Zr] as principal constituent
2224/05905	Gallium [Ga] as principal constituent	2224/05971	Chromium [Cr] as principal constituent
2224/05909	Indium [In] as principal constituent	2224/05972	Vanadium [V] as principal constituent
2224/05911	Tin [Sn] as principal constituent	2224/05973	Rhodium [Rh] as principal constituent
2224/05913	Bismuth [Bi] as principal constituent	2224/05976	Ruthenium [Ru] as principal constituent
2224/05914	Thallium [Tl] as principal constituent	2224/05978	Iridium [Ir] as principal constituent
2224/05916	Lead [Pb] as principal constituent	2224/05979	Niobium [Nb] as principal constituent
2224/05917	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/0598	Molybdenum [Mo] as principal constituent
2224/05918	Zinc [Zn] as principal constituent	2224/05981	Tantalum [Ta] as principal constituent
2224/0592	Antimony [Sb] as principal constituent	2224/05983	Rhenium [Re] as principal constituent
2224/05923	Magnesium [Mg] as principal constituent	2224/05984	Tungsten [W] as principal constituent
2224/05924	Aluminium [Al] as principal constituent	2224/05986	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/05938	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/05987	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/05988)
2224/05939	Silver [Ag] as principal constituent	2224/05988	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/05944	Gold [Au] as principal constituent	2224/0599	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/05947	Copper [Cu] as principal constituent	2224/05991	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/05949	Manganese [Mn] as principal constituent	2224/05993	with a principal constituent of the material being a solid not provided for in groups H01L 2224/059 - H01L 2224/05991 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/05955	Nickel [Ni] as principal constituent	2224/05994	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/059 - H01L 2224/05991
2224/05957	Cobalt [Co] as principal constituent	2224/05995	with a principal constituent of the material being a gas not provided for in groups H01L 2224/059 - H01L 2224/05991
2224/0596	Iron [Fe] as principal constituent		

2224/05998	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/06151	being uniform, i.e. having a uniform pitch across the array
2224/05999	Shape or distribution of the fillers	2224/06152	being non uniform, i.e. having a non uniform pitch across the array
2224/06	of a plurality of bonding areas	2224/06153	with a staggered arrangement, e.g. depopulated array
2224/0601	Structure	2224/06154	covering only portions of the surface to be connected
2224/0603	Bonding areas having different sizes, e.g. different heights or widths	2224/06155	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/0605	Shape	2224/06156	Covering only the central area of the surface to be connected, i.e. central arrangements
2224/06051	Bonding areas having different shapes	2224/06157	with specially adapted redistribution layers [RDL]
2224/061	Disposition	2224/06158	being disposed in a single wiring level, i.e. planar layout
2224/06102	the bonding areas being at different heights	2224/06159	being disposed in different wiring levels, i.e. resurf layout
2224/0612	Layout	2224/0616	Random array, i.e. array with no symmetry
2224/0613	Square or rectangular array	2224/06163	with a staggered arrangement
2224/06131	being uniform, i.e. having a uniform pitch across the array	2224/06164	covering only portions of the surface to be connected
2224/06132	being non uniform, i.e. having a non uniform pitch across the array	2224/06165	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/06133	with a staggered arrangement, e.g. depopulated array	2224/06166	Covering only the central area of the surface to be connected, i.e. central arrangements
2224/06134	covering only portions of the surface to be connected	2224/06167	with specially adapted redistribution layers [RDL]
2224/06135	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/06168	being disposed in a single wiring level, i.e. planar layout
2224/06136	Covering only the central area of the surface to be connected, i.e. central arrangements	2224/06169	being disposed in different wiring levels, i.e. resurf layout
2224/06137	with specially adapted redistribution layers [RDL]	2224/06177	Combinations of arrays with different layouts
2224/06138	being disposed in a single wiring level, i.e. planar layout	2224/06179	Corner adaptations, i.e. disposition of the bonding areas at the corners of the semiconductor or solid-state body
2224/06139	being disposed in different wiring levels, i.e. resurf layout	2224/0618	being disposed on at least two different sides of the body, e.g. dual array
2224/0614	Circular array, i.e. array with radial symmetry	2224/06181	On opposite sides of the body
2224/06141	being uniform, i.e. having a uniform pitch across the array	2224/06182	with specially adapted redistribution layers [RDL]
2224/06142	being non uniform, i.e. having a non uniform pitch across the array	2224/06183	On contiguous sides of the body
2224/06143	with a staggered arrangement, e.g. depopulated array	2224/06187	with specially adapted redistribution layers [RDL]
2224/06144	covering only portions of the surface to be connected	2224/06188	being disposed in a single wiring level, i.e. planar layout
2224/06145	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/06189	being disposed in different wiring levels, i.e. resurf layout
2224/06146	Covering only the central area of the surface to be connected, i.e. central arrangements	2224/065	Material
2224/06147	with specially adapted redistribution layers [RDL]	2224/06505	Bonding areas having different materials
2224/06148	being disposed in a single wiring level, i.e. planar layout	2224/0651	Function
2224/06149	being disposed in different wiring levels, i.e. resurf layout	2224/06515	Bonding areas having different functions
2224/0615	Mirror array, i.e. array having only a reflection symmetry, i.e. bilateral symmetry	2224/06517	including bonding areas providing primarily mechanical bonding
		2224/06519	including bonding areas providing primarily thermal dissipation

2224/07	. . .	Structure, shape, material or disposition of the bonding areas after the connecting process	2224/08167	. . . . .	the bonding area connecting to a bonding area disposed in a recess of the surface of the item
2224/08	. . . .	of an individual bonding area	2224/08168	. . . . .	the bonding area connecting to a bonding area protruding from the surface of the item
2224/0801	. . . .	Structure	2224/08175	. . . . .	the item being metallic
2224/0805	. . . .	Shape	2224/08183	. . . . .	the bonding area connecting to a potential ring of the item
2224/08052	. . . . .	in top view	2224/08187	. . . . .	the bonding area connecting to a bonding area disposed in a recess of the surface of the item
2224/08053	. . . . .	being non uniform along the bonding area	2224/08188	. . . . .	the bonding area connecting to a bonding area protruding from the surface of the item
2224/08054	. . . . .	being rectangular	2224/08195	. . . . .	the item being a discrete passive component
2224/08055	. . . . .	being square	2224/08197	. . . . .	the bonding area connecting to a bonding area disposed in a recess of the surface of the item
2224/08056	. . . . .	being circular or elliptic	2224/08198	. . . . .	the bonding area connecting to a bonding area protruding from the surface of the item
2224/08057	. . . . .	in side view	2224/08221	. . . . .	the body and the item being stacked
2224/08058	. . . . .	being non uniform along the bonding area	2224/08225	. . . . .	the item being non-metallic, e.g. insulating substrate with or without metallisation
2224/08059	. . . . .	comprising protrusions or indentations	2224/0823	. . . . .	the bonding area connecting to a pin of the item
2224/0807	. . . . .	of bonding interfaces, e.g. interlocking features	2224/08233	. . . . .	the bonding area connecting to a potential ring of the item
2224/081	. . . . .	Disposition	2224/08235	. . . . .	the bonding area connecting to a via metallisation of the item
2224/08111	. . . . .	the bonding area being disposed in a recess of the surface of the body	2224/08237	. . . . .	the bonding area connecting to a bonding area disposed in a recess of the surface of the item
2224/08112	. . . . .	the bonding area being at least partially embedded in the surface of the body	2224/08238	. . . . .	the bonding area connecting to a bonding area protruding from the surface of the item
2224/08113	. . . . .	the whole bonding area protruding from the surface of the body	2224/08245	. . . . .	the item being metallic
2224/0812	. . . . .	the bonding area connecting directly to another bonding area, i.e. connectorless bonding, e.g. bumpless bonding	2224/08253	. . . . .	the bonding area connecting to a potential ring of the item
2224/08121	. . . . .	the connected bonding areas being not aligned with respect to each other	2224/08257	. . . . .	the bonding area connecting to a bonding area disposed in a recess of the surface of the item
2224/08123	. . . . .	the bonding area connecting directly to at least two bonding areas	2224/08258	. . . . .	the bonding area connecting to a bonding area protruding from the surface of the item
2224/08135	. . . . .	the bonding area connecting between different semiconductor or solid-state bodies, i.e. chip-to-chip	2224/08265	. . . . .	the item being a discrete passive component
2224/08137	. . . . .	the bodies being arranged next to each other, e.g. on a common substrate	2224/08267	. . . . .	the bonding area connecting to a bonding area disposed in a recess of the surface of the item
2224/08145	. . . . .	the bodies being stacked	2224/08268	. . . . .	the bonding area connecting to a bonding area protruding from the surface of the item
2224/08146	. . . . .	the bonding area connecting to a via connection in the body	2224/085	. . . . .	Material
2224/08147	. . . . .	the bonding area connecting to a bonding area disposed in a recess of the surface of the body	2224/08501	. . . . .	at the bonding interface
2224/08148	. . . . .	the bonding area connecting to a bonding area protruding from the surface of the body	2224/08502	. . . . .	comprising an eutectic alloy
2224/08151	. . . . .	the bonding area connecting between a semiconductor or solid-state body and an item not being a semiconductor or solid-state body, e.g. chip-to-substrate, chip-to-passive			
2224/08153	. . . . .	the body and the item being arranged next to each other, e.g. on a common substrate			
2224/08155	. . . . .	the item being non-metallic, e.g. being an insulating substrate with or without metallisation			
2224/0816	. . . . .	the bonding area connecting to a pin of the item			
2224/08163	. . . . .	the bonding area connecting to a potential ring of the item			
2224/08165	. . . . .	the bonding area connecting to a via metallisation of the item			

2224/08503	. . . . .	comprising an intermetallic compound	2224/09165	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/08505	. . . . .	outside the bonding interface	2224/09177	. . . . .	Combinations of arrays with different layouts
2224/08506	. . . . .	comprising an eutectic alloy	2224/09179	. . . . .	Corner adaptations, i.e. disposition of the bonding areas at the corners of the semiconductor or solid-state body
2224/09	. . . . .	of a plurality of bonding areas	2224/0918	. . . . .	being disposed on at least two different sides of the body, e.g. dual array
2224/0901	. . . . .	Structure	2224/09181	. . . . .	On opposite sides of the body
2224/0903	. . . . .	Bonding areas having different sizes, e.g. different diameters, heights or widths	2224/09183	. . . . .	On contiguous sides of the body
2224/0905	. . . . .	Shape	2224/095	. . . . .	Material
2224/09051	. . . . .	Bonding areas having different shapes	2224/09505	. . . . .	Bonding areas having different materials
2224/09055	. . . . .	of their bonding interfaces	2224/0951	. . . . .	Function
2224/091	. . . . .	Disposition	2224/09515	. . . . .	Bonding areas having different functions
2224/09102	. . . . .	the bonding areas being at different heights	2224/09517	. . . . .	including bonding areas providing primarily mechanical support
2224/09103	. . . . .	on the semiconductor or solid-state body	2224/09519	. . . . .	including bonding areas providing primarily thermal dissipation
2224/09104	. . . . .	outside the semiconductor or solid-state body	2224/10	. . . . .	Bump connectors; Manufacturing methods related thereto
2224/0912	. . . . .	Layout (layout of bonding areas prior to the connecting process H01L 2224/0612)	2224/1012	. . . . .	Auxiliary members for bump connectors, e.g. spacers
2224/0913	. . . . .	Square or rectangular array	2224/10122	. . . . .	being formed on the semiconductor or solid-state body to be connected
2224/09132	. . . . .	being non uniform, i.e. having a non uniform pitch across the array	2224/10125	. . . . .	Reinforcing structures
2224/09133	. . . . .	with a staggered arrangement, e.g. depopulated array	2224/10126	. . . . .	Bump collar
2224/09134	. . . . .	covering only portions of the surface to be connected	2224/10135	. . . . .	Alignment aids
2224/09135	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/10145	. . . . .	Flow barriers
2224/0914	. . . . .	Circular array, i.e. array with radial symmetry	2224/10152	. . . . .	being formed on an item to be connected not being a semiconductor or solid-state body
2224/09142	. . . . .	being non uniform, i.e. having a non uniform pitch across the array	2224/10155	. . . . .	Reinforcing structures
2224/09143	. . . . .	with a staggered arrangement	2224/10156	. . . . .	Bump collar
2224/09144	. . . . .	covering only portions of the surface to be connected	2224/10165	. . . . .	Alignment aids
2224/09145	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/10175	. . . . .	Flow barriers
2224/0915	. . . . .	Mirror array, i.e. array having only a reflection symmetry, i.e. bilateral symmetry	2224/11	. . . . .	Manufacturing methods
2224/09151	. . . . .	being uniform, i.e. having a uniform pitch across the array	2224/11001	. . . . .	Involving a temporary auxiliary member not forming part of the manufacturing apparatus, e.g. removable or sacrificial coating, film or substrate
2224/09152	. . . . .	being non uniform, i.e. having a non uniform pitch across the array	2224/11002	. . . . .	for supporting the semiconductor or solid-state body
2224/09153	. . . . .	with a staggered arrangement, e.g. depopulated array	2224/11003	. . . . .	for holding or transferring the bump preform
2224/09154	. . . . .	covering only portions of the surface to be connected	2224/11005	. . . . .	for aligning the bump connector, e.g. marks, spacers
2224/09155	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/11009	. . . . .	for protecting parts during manufacture
2224/09156	. . . . .	Covering only the central area of the surface to be connected, i.e. central arrangements	2224/11011	. . . . .	Involving a permanent auxiliary member, i.e. a member which is left at least partly in the finished device, e.g. coating, dummy feature
2224/0916	. . . . .	Random array, i.e. array with no symmetry	2224/11013	. . . . .	for holding or confining the bump connector, e.g. solder flow barrier
2224/09163	. . . . .	with a staggered arrangement	2224/11015	. . . . .	for aligning the bump connector, e.g. marks, spacers
2224/09164	. . . . .	covering only portions of the surface to be connected	2224/11019	. . . . .	for protecting parts during the process
			2224/111	. . . . .	Manufacture and pre-treatment of the bump connector preform
			2224/1111	. . . . .	Shaping
			2224/1112	. . . . .	Applying permanent coating
			2224/113	. . . . .	by local deposition of the material of the bump connector

2224/1131	. . . . .	in liquid form	2224/11526	. . . . .	involving the material of the bonding area, e.g. bonding pad or under bump metallisation [UBM]
2224/11312	. . . . .	Continuous flow, e.g. using a microsyringe, a pump, a nozzle or extrusion	2224/1155	. . . . .	Selective modification
2224/11318	. . . . .	by dispensing droplets	2224/11552	. . . . .	using a laser or a focussed ion beam [FIB]
2224/1132	. . . . .	Screen printing, i.e. using a stencil	2224/11554	. . . . .	Stereolithography, i.e. solidification of a pattern defined by a laser trace in a photosensitive resin
2224/1133	. . . . .	in solid form	2224/116	. . . . .	by patterning a pre-deposited material (treatment of parts prior to assembly of the devices H01L 21/48)
2224/11332	. . . . .	using a powder	2224/11602	. . . . .	Mechanical treatment, e.g. polishing, grinding
2224/11334	. . . . .	using preformed bumps	2224/1161	. . . . .	Physical or chemical etching
2224/1134	. . . . .	Stud bumping, i.e. using a wire-bonding apparatus	2224/11612	. . . . .	by physical means only
2224/114	. . . . .	by blanket deposition of the material of the bump connector	2224/11614	. . . . .	by chemical means only
2224/1141	. . . . .	in liquid form	2224/11616	. . . . .	Chemical mechanical polishing [CMP]
2224/11416	. . . . .	Spin coating	2224/11618	. . . . .	with selective exposure, development and removal of a photosensitive bump material, e.g. of a photosensitive conductive resin
2224/11418	. . . . .	Spray coating	2224/1162	. . . . .	using masks
2224/1142	. . . . .	Curtain coating	2224/11622	. . . . .	Photolithography
2224/11422	. . . . .	by dipping, e.g. in a solder bath (hot-dipping C23C 2/00)	2224/1163	. . . . .	using a laser or a focused ion beam [FIB]
2224/11424	. . . . .	Immersion coating, e.g. in a solder bath (immersion processes C23C 2/00)	2224/11632	. . . . .	Ablation by means of a laser or focused ion beam [FIB]
2224/11426	. . . . .	Chemical solution deposition [CSD], i.e. using a liquid precursor	2224/117	. . . . .	involving monitoring, e.g. feedback loop
2224/11428	. . . . .	Wave coating	2224/118	. . . . .	Post-treatment of the bump connector
2224/1143	. . . . .	in solid form	2224/1181	. . . . .	Cleaning, e.g. oxide removal step, desmearing
2224/11436	. . . . .	Lamination of a preform, e.g. foil, sheet or layer	2224/1182	. . . . .	Applying permanent coating, e.g. in-situ coating
2224/11438	. . . . .	the preform being at least partly pre-patterned	2224/11821	. . . . .	Spray coating
2224/1144	. . . . .	by transfer printing	2224/11822	. . . . .	by dipping, e.g. in a solder bath
2224/11442	. . . . .	using a powder	2224/11823	. . . . .	Immersion coating, e.g. in a solder bath
2224/11444	. . . . .	in gaseous form	2224/11824	. . . . .	Chemical solution deposition [CSD], i.e. using a liquid precursor
2224/1145	. . . . .	Physical vapour deposition [PVD], e.g. evaporation, or sputtering	2224/11825	. . . . .	Plating, e.g. electroplating, electroless plating
2224/11452	. . . . .	Chemical vapour deposition [CVD], e.g. laser CVD	2224/11826	. . . . .	Physical vapour deposition [PVD], e.g. evaporation, or sputtering
2224/1146	. . . . .	Plating	2224/11827	. . . . .	Chemical vapour deposition [CVD], e.g. laser CVD
2224/11462	. . . . .	Electroplating	2224/1183	. . . . .	Reworking, e.g. shaping (reflowing H01L 2224/11849)
2224/11464	. . . . .	Electroless plating	2224/11831	. . . . .	involving a chemical process, e.g. etching the bump connector
2224/11466	. . . . .	Conformal deposition, i.e. blanket deposition of a conformal layer on a patterned surface	2224/1184	. . . . .	involving a mechanical process, e.g. planarising the bump connector
2224/1147	. . . . .	using a lift-off mask	2224/11845	. . . . .	Chemical mechanical polishing [CMP]
2224/11472	. . . . .	Profile of the lift-off mask	2224/11848	. . . . .	Thermal treatments, e.g. annealing, controlled cooling
2224/11474	. . . . .	Multilayer masks	2224/11849	. . . . .	Reflowing
2224/1148	. . . . .	Permanent masks, i.e. masks left in the finished device, e.g. passivation layers	2224/119	. . . . .	Methods of manufacturing bump connectors involving a specific sequence of method steps
2224/115	. . . . .	by chemical or physical modification of a pre-existing or pre-deposited material	2224/11901	. . . . .	with repetition of the same manufacturing step
2224/11502	. . . . .	Pre-existing or pre-deposited material	2224/11902	. . . . .	Multiple masking steps
2224/11505	. . . . .	Sintering	2224/11903	. . . . .	using different masks
2224/1151	. . . . .	Anodisation	2224/11906	. . . . .	with modification of the same mask
2224/11515	. . . . .	Curing and solidification, e.g. of a photosensitive bump material			
2224/1152	. . . . .	Self-assembly, e.g. self-agglomeration of the bump material in a fluid			
2224/11522	. . . . .	Auxiliary means therefor, e.g. for self-assembly activation			
2224/11524	. . . . .	with special adaptation of the surface or of an auxiliary substrate, e.g. surface shape specially adapted for the self-assembly process			

2224/1191	. . . . .	Forming a passivation layer after forming the bump connector	2224/13027	. . . . .	the bump connector being offset with respect to the bonding area, e.g. bond pad
2224/11912	. . . . .	the bump being used as a mask for patterning other parts	2224/13028	. . . . .	the bump connector being disposed on at least two separate bonding areas, e.g. bond pads
2224/11914	. . . . .	the under bump metallisation [UBM] being used as a mask for patterning other parts	2224/13075	. . . . .	Plural core members
2224/11916	. . . . .	a passivation layer being used as a mask for patterning other parts	2224/13076	. . . . .	being mutually engaged together, e.g. through inserts
2224/12	. . .	Structure, shape, material or disposition of the bump connectors prior to the connecting process	2224/13078	. . . . .	being disposed next to each other, e.g. side-to-side arrangements
2224/12105	. . . . .	Bump connectors formed on an encapsulation of the semiconductor or solid-state body, e.g. bumps on chip-scale packages	2224/1308	. . . . .	being stacked
2224/13	. . . . .	of an individual bump connector	2224/13082	. . . . .	Two-layer arrangements
2224/13001	. . . . .	Core members of the bump connector	2224/13083	. . . . .	Three-layer arrangements
2224/13005	. . . . .	Structure	2224/13084	. . . . .	Four-layer arrangements
2224/13006	. . . . .	Bump connector larger than the underlying bonding area, e.g. than the under bump metallisation [UBM]	2224/13099	. . . . .	Material
2224/13007	. . . . .	Bump connector smaller than the underlying bonding area, e.g. than the under bump metallisation [UBM]	2224/131	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/13008	. . . . .	Bump connector integrally formed with a redistribution layer on the semiconductor or solid-state body	2224/13101	. . . . .	the principal constituent melting at a temperature of less than 400°C
2224/13009	. . . . .	Bump connector integrally formed with a via connection of the semiconductor or solid-state body	2224/13105	. . . . .	Gallium [Ga] as principal constituent
2224/1301	. . . . .	Shape	2224/13109	. . . . .	Indium [In] as principal constituent
2224/13011	. . . . .	comprising apertures or cavities, e.g. hollow bump	2224/13111	. . . . .	Tin [Sn] as principal constituent
2224/13012	. . . . .	in top view	2224/13113	. . . . .	Bismuth [Bi] as principal constituent
2224/13013	. . . . .	being rectangular or square	2224/13114	. . . . .	Thallium [Tl] as principal constituent
2224/13014	. . . . .	being circular or elliptic	2224/13116	. . . . .	Lead [Pb] as principal constituent
2224/13015	. . . . .	comprising protrusions or indentations	2224/13117	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/13016	. . . . .	in side view	2224/13118	. . . . .	Zinc [Zn] as principal constituent
2224/13017	. . . . .	being non uniform along the bump connector	2224/1312	. . . . .	Antimony [Sb] as principal constituent
2224/13018	. . . . .	comprising protrusions or indentations	2224/13123	. . . . .	Magnesium [Mg] as principal constituent
2224/13019	. . . . .	at the bonding interface of the bump connector, i.e. on the surface of the bump connector	2224/13124	. . . . .	Aluminium [Al] as principal constituent
2224/1302	. . . . .	Disposition	2224/13138	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/13021	. . . . .	the bump connector being disposed in a recess of the surface	2224/13139	. . . . .	Silver [Ag] as principal constituent
2224/13022	. . . . .	the bump connector being at least partially embedded in the surface	2224/13144	. . . . .	Gold [Au] as principal constituent
2224/13023	. . . . .	the whole bump connector protruding from the surface	2224/13147	. . . . .	Copper [Cu] as principal constituent
2224/13024	. . . . .	the bump connector being disposed on a redistribution layer on the semiconductor or solid-state body	2224/13149	. . . . .	Manganese [Mn] as principal constituent
2224/13025	. . . . .	the bump connector being disposed on a via connection of the semiconductor or solid-state body	2224/13155	. . . . .	Nickel [Ni] as principal constituent
2224/13026	. . . . .	relative to the bonding area, e.g. bond pad, of the semiconductor or solid-state body	2224/13157	. . . . .	Cobalt [Co] as principal constituent
			2224/1316	. . . . .	Iron [Fe] as principal constituent
			2224/13163	. . . . .	the principal constituent melting at a temperature of greater than 1550°C

2224/13164	Palladium [Pd] as principal constituent	2224/132	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/13166	Titanium [Ti] as principal constituent	2224/13201	the principal constituent melting at a temperature of less than 400°C
2224/13169	Platinum [Pt] as principal constituent	2224/13205	Gallium [Ga] as principal constituent
2224/1317	Zirconium [Zr] as principal constituent	2224/13209	Indium [In] as principal constituent
2224/13171	Chromium [Cr] as principal constituent	2224/13211	Tin [Sn] as principal constituent
2224/13172	Vanadium [V] as principal constituent	2224/13213	Bismuth [Bi] as principal constituent
2224/13173	Rhodium [Rh] as principal constituent	2224/13214	Thallium [Tl] as principal constituent
2224/13176	Ruthenium [Ru] as principal constituent	2224/13216	Lead [Pb] as principal constituent
2224/13178	Iridium [Ir] as principal constituent	2224/13217	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/13179	Niobium [Nb] as principal constituent	2224/13218	Zinc [Zn] as principal constituent
2224/1318	Molybdenum [Mo] as principal constituent	2224/1322	Antimony [Sb] as principal constituent
2224/13181	Tantalum [Ta] as principal constituent	2224/13223	Magnesium [Mg] as principal constituent
2224/13183	Rhenium [Re] as principal constituent	2224/13224	Aluminium [Al] as principal constituent
2224/13184	Tungsten [W] as principal constituent	2224/13238	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/13186	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/13239	Silver [Ag] as principal constituent
2224/13187	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/13188)	2224/13244	Gold [Au] as principal constituent
2224/13188	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/13247	Copper [Cu] as principal constituent
2224/1319	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/13249	Manganese [Mn] as principal constituent
2224/13191	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/13255	Nickel [Ni] as principal constituent
2224/13193	with a principal constituent of the material being a solid not provided for in groups H01L 2224/131 - H01L 2224/13191 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/13257	Cobalt [Co] as principal constituent
2224/13194	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/131 - H01L 2224/13191	2224/1326	Iron [Fe] as principal constituent
2224/13195	with a principal constituent of the material being a gas not provided for in groups H01L 2224/131 - H01L 2224/13191	2224/13263	the principal constituent melting at a temperature of greater than 1550°C
2224/13198	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/13264	Palladium [Pd] as principal constituent
2224/13199	Material of the matrix	2224/13266	Titanium [Ti] as principal constituent
		2224/13269	Platinum [Pt] as principal constituent
		2224/1327	Zirconium [Zr] as principal constituent

2224/13271	Chromium [Cr] as principal constituent	2224/13309	Indium [In] as principal constituent
2224/13272	Vanadium [V] as principal constituent	2224/13311	Tin [Sn] as principal constituent
2224/13273	Rhodium [Rh] as principal constituent	2224/13313	Bismuth [Bi] as principal constituent
2224/13276	Ruthenium [Ru] as principal constituent	2224/13314	Thallium [Tl] as principal constituent
2224/13278	Iridium [Ir] as principal constituent	2224/13316	Lead [Pb] as principal constituent
2224/13279	Niobium [Nb] as principal constituent	2224/13317	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/1328	Molybdenum [Mo] as principal constituent	2224/13318	Zinc [Zn] as principal constituent
2224/13281	Tantalum [Ta] as principal constituent	2224/1332	Antimony [Sb] as principal constituent
2224/13283	Rhenium [Re] as principal constituent	2224/13323	Magnesium [Mg] as principal constituent
2224/13284	Tungsten [W] as principal constituent	2224/13324	Aluminium [Al] as principal constituent
2224/13286	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/13338	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/13287	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/13288)	2224/13339	Silver [Ag] as principal constituent
2224/13288	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/13344	Gold [Au] as principal constituent
2224/1329	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/13347	Copper [Cu] as principal constituent
2224/13291	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/13349	Manganese [Mn] as principal constituent
2224/13293	with a principal constituent of the material being a solid not provided for in groups H01L 2224/132 - H01L 2224/13291 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/13355	Nickel [Ni] as principal constituent
2224/13294	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/132 - H01L 2224/13291	2224/13357	Cobalt [Co] as principal constituent
2224/13295	with a principal constituent of the material being a gas not provided for in groups H01L 2224/132 - H01L 2224/13291	2224/1336	Iron [Fe] as principal constituent
2224/13298	Fillers	2224/13363	the principal constituent melting at a temperature of greater than 1550°C
2224/13299	Base material	2224/13364	Palladium [Pd] as principal constituent
2224/133	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/13366	Titanium [Ti] as principal constituent
2224/13301	the principal constituent melting at a temperature of less than 400°C	2224/13369	Platinum [Pt] as principal constituent
2224/13305	Gallium [Ga] as principal constituent	2224/1337	Zirconium [Zr] as principal constituent
		2224/13371	Chromium [Cr] as principal constituent
		2224/13372	Vanadium [V] as principal constituent
		2224/13373	Rhodium [Rh] as principal constituent
		2224/13376	Ruthenium [Ru] as principal constituent
		2224/13378	Iridium [Ir] as principal constituent
		2224/13379	Niobium [Nb] as principal constituent

2224/1338	Molybdenum [Mo] as principal constituent	2224/13413	Bismuth [Bi] as principal constituent
2224/13381	Tantalum [Ta] as principal constituent	2224/13414	Thallium [Tl] as principal constituent
2224/13383	Rhenium [Re] as principal constituent	2224/13416	Lead [Pb] as principal constituent
2224/13384	Tungsten [W] as principal constituent	2224/13417	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/13386	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/13418	Zinc [Zn] as principal constituent
2224/13387	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/13388)	2224/1342	Antimony [Sb] as principal constituent
2224/13388	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/13423	Magnesium [Mg] as principal constituent
2224/1339	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/13424	Aluminium [Al] as principal constituent
2224/13391	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/13438	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/13393	with a principal constituent of the material being a solid not provided for in groups H01L 2224/133 - H01L 2224/13391 e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/13439	Silver [Ag] as principal constituent
2224/13394	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/133 - H01L 2224/13391	2224/13444	Gold [Au] as principal constituent
2224/13395	with a principal constituent of the material being a gas not provided for in groups H01L 2224/133 - H01L 2224/13391	2224/13447	Copper [Cu] as principal constituent
2224/13398	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/13449	Manganese [Mn] as principal constituent
2224/13399	Coating material	2224/13455	Nickel [Ni] as principal constituent
2224/134	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/13457	Cobalt [Co] as principal constituent
2224/13401	the principal constituent melting at a temperature of less than 400°C	2224/1346	Iron [Fe] as principal constituent
2224/13405	Gallium [Ga] as principal constituent	2224/13463	the principal constituent melting at a temperature of greater than 1550°C
2224/13409	Indium [In] as principal constituent	2224/13464	Palladium [Pd] as principal constituent
2224/13411	Tin [Sn] as principal constituent	2224/13466	Titanium [Ti] as principal constituent
		2224/13469	Platinum [Pt] as principal constituent
		2224/1347	Zirconium [Zr] as principal constituent
		2224/13471	Chromium [Cr] as principal constituent
		2224/13472	Vanadium [V] as principal constituent
		2224/13473	Rhodium [Rh] as principal constituent
		2224/13476	Ruthenium [Ru] as principal constituent
		2224/13478	Iridium [Ir] as principal constituent
		2224/13479	Niobium [Nb] as principal constituent
		2224/1348	Molybdenum [Mo] as principal constituent
		2224/13481	Tantalum [Ta] as principal constituent

2224/13483	Rhenium [Re] as principal constituent	2224/13566	Both on and outside the bonding interface of the bump connector
2224/13484	Tungsten [W] as principal constituent	2224/1357	Single coating layer
2224/13486	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/13575	Plural coating layers
2224/13487	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/13488)	2224/13576	being mutually engaged together, e.g. through inserts
2224/13488	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/13578	being disposed next to each other, e.g. side-to-side arrangements
2224/1349	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/1358	being stacked
2224/13491	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/13582	Two-layer coating
2224/13493	with a principal constituent of the material being a solid not provided for in groups H01L 2224/134 - H01L 2224/13491 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/13583	Three-layer coating
2224/13494	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/134 - H01L 2224/13491	2224/13584	Four-layer coating
2224/13495	with a principal constituent of the material being a gas not provided for in groups H01L 2224/134 - H01L 2224/13491	2224/13599	Material
2224/13498	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/136	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/13499	Shape or distribution of the fillers	2224/13601	the principal constituent melting at a temperature of less than 400°C
2224/1354	Coating	2224/13605	Gallium [Ga] as principal constituent
2224/13541	Structure	2224/13609	Indium [In] as principal constituent
2224/1355	Shape	2224/13611	Tin [Sn] as principal constituent
2224/13551	being non uniform	2224/13613	Bismuth [Bi] as principal constituent
2224/13552	comprising protrusions or indentations	2224/13614	Thallium [Tl] as principal constituent
2224/13553	at the bonding interface of the bump connector, i.e. on the surface of the bump connector	2224/13616	Lead [Pb] as principal constituent
2224/1356	Disposition	2224/13617	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/13561	On the entire surface of the core, i.e. integral coating	2224/13618	Zinc [Zn] as principal constituent
2224/13562	On the entire exposed surface of the core	2224/1362	Antimony [Sb] as principal constituent
2224/13563	Only on parts of the surface of the core, i.e. partial coating	2224/13623	Magnesium [Mg] as principal constituent
2224/13564	Only on the bonding interface of the bump connector	2224/13624	Aluminium [Al] as principal constituent
2224/13565	Only outside the bonding interface of the bump connector	2224/13638	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
		2224/13639	Silver [Ag] as principal constituent
		2224/13644	Gold [Au] as principal constituent
		2224/13647	Copper [Cu] as principal constituent
		2224/13649	Manganese [Mn] as principal constituent
		2224/13655	Nickel [Ni] as principal constituent
		2224/13657	Cobalt [Co] as principal constituent
		2224/1366	Iron [Fe] as principal constituent
		2224/13663	the principal constituent melting at a temperature of greater than 1550°C
		2224/13664	Palladium [Pd] as principal constituent

2224/13666	.. . . . .	Titanium [Ti] as principal constituent	2224/137	.. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/13669	.. . . . .	Platinum [Pt] as principal constituent	2224/13701	.. . . . .	the principal constituent melting at a temperature of less than 400°C
2224/1367	.. . . . .	Zirconium [Zr] as principal constituent	2224/13705	.. . . . .	Gallium [Ga] as principal constituent
2224/13671	.. . . . .	Chromium [Cr] as principal constituent	2224/13709	.. . . . .	Indium [In] as principal constituent
2224/13672	.. . . . .	Vanadium [V] as principal constituent	2224/13711	.. . . . .	Tin [Sn] as principal constituent
2224/13673	.. . . . .	Rhodium [Rh] as principal constituent	2224/13713	.. . . . .	Bismuth [Bi] as principal constituent
2224/13676	.. . . . .	Ruthenium [Ru] as principal constituent	2224/13714	.. . . . .	Thallium [Tl] as principal constituent
2224/13678	.. . . . .	Iridium [Ir] as principal constituent	2224/13716	.. . . . .	Lead [Pb] as principal constituent
2224/13679	.. . . . .	Niobium [Nb] as principal constituent	2224/13717	.. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/1368	.. . . . .	Molybdenum [Mo] as principal constituent	2224/13718	.. . . . .	Zinc [Zn] as principal constituent
2224/13681	.. . . . .	Tantalum [Ta] as principal constituent	2224/1372	.. . . . .	Antimony [Sb] as principal constituent
2224/13683	.. . . . .	Rhenium [Re] as principal constituent	2224/13723	.. . . . .	Magnesium [Mg] as principal constituent
2224/13684	.. . . . .	Tungsten [W] as principal constituent	2224/13724	.. . . . .	Aluminium [Al] as principal constituent
2224/13686	.. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/13738	.. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/13687	.. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/13688)	2224/13739	.. . . . .	Silver [Ag] as principal constituent
2224/13688	.. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/13744	.. . . . .	Gold [Au] as principal constituent
2224/1369	.. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/13747	.. . . . .	Copper [Cu] as principal constituent
2224/13691	.. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/13749	.. . . . .	Manganese [Mn] as principal constituent
2224/13693	.. . . . .	with a principal constituent of the material being a solid not provided for in groups H01L 2224/136 - H01L 2224/13691 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/13755	.. . . . .	Nickel [Ni] as principal constituent
2224/13694	.. . . . .	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/136 - H01L 2224/13691	2224/13757	.. . . . .	Cobalt [Co] as principal constituent
2224/13695	.. . . . .	with a principal constituent of the material being a gas not provided for in groups H01L 2224/136 - H01L 2224/13691	2224/1376	.. . . . .	Iron [Fe] as principal constituent
2224/13698	.. . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/13763	.. . . . .	the principal constituent melting at a temperature of greater than 1550°C
2224/13699	.. . . . .	Material of the matrix	2224/13764	.. . . . .	Palladium [Pd] as principal constituent
			2224/13766	.. . . . .	Titanium [Ti] as principal constituent
			2224/13769	.. . . . .	Platinum [Pt] as principal constituent
			2224/1377	.. . . . .	Zirconium [Zr] as principal constituent

2224/13771	Chromium [Cr] as principal constituent	2224/13809	Indium [In] as principal constituent
2224/13772	Vanadium [V] as principal constituent	2224/13811	Tin [Sn] as principal constituent
2224/13773	Rhodium [Rh] as principal constituent	2224/13813	Bismuth [Bi] as principal constituent
2224/13776	Ruthenium [Ru] as principal constituent	2224/13814	Thallium [Tl] as principal constituent
2224/13778	Iridium [Ir] as principal constituent	2224/13816	Lead [Pb] as principal constituent
2224/13779	Niobium [Nb] as principal constituent	2224/13817	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/1378	Molybdenum [Mo] as principal constituent	2224/13818	Zinc [Zn] as principal constituent
2224/13781	Tantalum [Ta] as principal constituent	2224/1382	Antimony [Sb] as principal constituent
2224/13783	Rhenium [Re] as principal constituent	2224/13823	Magnesium [Mg] as principal constituent
2224/13784	Tungsten [W] as principal constituent	2224/13824	Aluminium [Al] as principal constituent
2224/13786	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/13838	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/13787	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/13788)	2224/13839	Silver [Ag] as principal constituent
2224/13788	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/13844	Gold [Au] as principal constituent
2224/1379	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/13847	Copper [Cu] as principal constituent
2224/13791	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/13849	Manganese [Mn] as principal constituent
2224/13793	with a principal constituent of the material being a solid not provided for in groups H01L 2224/137 - H01L 2224/13791 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/13855	Nickel [Ni] as principal constituent
2224/13794	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/137 - H01L 2224/13791	2224/13857	Cobalt [Co] as principal constituent
2224/13795	with a principal constituent of the material being a gas not provided for in groups H01L 2224/137 - H01L 2224/13791	2224/1386	Iron [Fe] as principal constituent
2224/13798	Fillers	2224/13863	the principal constituent melting at a temperature of greater than 1550°C
2224/13799	Base material	2224/13864	Palladium [Pd] as principal constituent
2224/138	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/13866	Titanium [Ti] as principal constituent
2224/13801	the principal constituent melting at a temperature of less than 400°C	2224/13869	Platinum [Pt] as principal constituent
2224/13805	Gallium [Ga] as principal constituent	2224/1387	Zirconium [Zr] as principal constituent
		2224/13871	Chromium [Cr] as principal constituent
		2224/13872	Vanadium [V] as principal constituent
		2224/13873	Rhodium [Rh] as principal constituent
		2224/13876	Ruthenium [Ru] as principal constituent
		2224/13878	Iridium [Ir] as principal constituent
		2224/13879	Niobium [Nb] as principal constituent

2224/1388	Molybdenum [Mo] as principal constituent	2224/13913	Bismuth [Bi] as principal constituent
2224/13881	Tantalum [Ta] as principal constituent	2224/13914	Thallium [Tl] as principal constituent
2224/13883	Rhenium [Re] as principal constituent	2224/13916	Lead [Pb] as principal constituent
2224/13884	Tungsten [W] as principal constituent	2224/13917	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/13886	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/13918	Zinc [Zn] as principal constituent
2224/13887	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/13888)	2224/1392	Antimony [Sb] as principal constituent
2224/13888	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/13923	Magnesium [Mg] as principal constituent
2224/1389	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/13924	Aluminium [Al] as principal constituent
2224/13891	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/13938	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/13893	with a principal constituent of the material being a solid not provided for in groups H01L 2224/138 - H01L 2224/13891 e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/13939	Silver [Ag] as principal constituent
2224/13894	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/138 - H01L 2224/13891	2224/13944	Gold [Au] as principal constituent
2224/13895	with a principal constituent of the material being a gas not provided for in groups H01L 2224/138 - H01L 2224/13891	2224/13947	Copper [Cu] as principal constituent
2224/13898	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/13949	Manganese [Mn] as principal constituent
2224/13899	Coating material	2224/13955	Nickel [Ni] as principal constituent
2224/139	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/13957	Cobalt [Co] as principal constituent
2224/13901	the principal constituent melting at a temperature of less than 400°C	2224/1396	Iron [Fe] as principal constituent
2224/13905	Gallium [Ga] as principal constituent	2224/13963	the principal constituent melting at a temperature of greater than 1550°C
2224/13909	Indium [In] as principal constituent	2224/13964	Palladium [Pd] as principal constituent
2224/13911	Tin [Sn] as principal constituent	2224/13966	Titanium [Ti] as principal constituent
		2224/13969	Platinum [Pt] as principal constituent
		2224/1397	Zirconium [Zr] as principal constituent
		2224/13971	Chromium [Cr] as principal constituent
		2224/13972	Vanadium [V] as principal constituent
		2224/13973	Rhodium [Rh] as principal constituent
		2224/13976	Ruthenium [Ru] as principal constituent
		2224/13978	Iridium [Ir] as principal constituent
		2224/13979	Niobium [Nb] as principal constituent
		2224/1398	Molybdenum [Mo] as principal constituent
		2224/13981	Tantalum [Ta] as principal constituent

2224/13983	Rhenium [Re] as principal constituent	2224/14133	with a staggered arrangement, e.g. depopulated array
2224/13984	Tungsten [W] as principal constituent	2224/14134	covering only portions of the surface to be connected
2224/13986	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/14135	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/13987	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/13988)	2224/14136	Covering only the central area of the surface to be connected, i.e. central arrangements
2224/13988	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/1414	Circular array, i.e. array with radial symmetry
2224/1399	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/14141	being uniform, i.e. having a uniform pitch across the array
2224/13991	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/14142	being non uniform, i.e. having a non uniform pitch across the array
2224/13993	with a principal constituent of the material being a solid not provided for in groups H01L 2224/139 - H01L 2224/13991 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/14143	with a staggered arrangement, e.g. depopulated array
2224/13994	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/139 - H01L 2224/13991	2224/14144	covering only portions of the surface to be connected
2224/13995	with a principal constituent of the material being a gas not provided for in groups H01L 2224/139 - H01L 2224/13991	2224/14145	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/13998	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/14146	Covering only the central area of the surface to be connected, i.e. central arrangements
2224/13999	Shape or distribution of the fillers	2224/1415	Mirror array, i.e. array having only a reflection symmetry, i.e. bilateral symmetry
2224/14	of a plurality of bump connectors	2224/14151	being uniform, i.e. having a uniform pitch across the array
2224/1401	Structure	2224/14152	being non uniform, i.e. having a non uniform pitch across the array
2224/1403	Bump connectors having different sizes, e.g. different diameters, heights or widths	2224/14153	with a staggered arrangement, e.g. depopulated array
2224/1405	Shape	2224/14154	covering only portions of the surface to be connected
2224/14051	Bump connectors having different shapes	2224/14155	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/141	Disposition	2224/14156	Covering only the central area of the surface to be connected, i.e. central arrangements
2224/14104	relative to the bonding areas, e.g. bond pads, of the semiconductor or solid-state body	2224/1416	Random layout, i.e. layout with no symmetry
2224/1411	the bump connectors being bonded to at least one common bonding area	2224/14163	with a staggered arrangement
2224/1412	Layout	2224/14164	covering only portions of the surface to be connected
2224/1413	Square or rectangular array	2224/14165	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/14131	being uniform, i.e. having a uniform pitch across the array	2224/14166	Covering only the central area of the surface to be connected, i.e. central arrangements
2224/14132	being non uniform, i.e. having a non uniform pitch across the array	2224/14177	Combinations of arrays with different layouts
		2224/14179	Corner adaptations, i.e. disposition of the bump connectors at the corners of the semiconductor or solid-state body
		2224/1418	being disposed on at least two different sides of the body, e.g. dual array
		2224/14181	On opposite sides of the body
		2224/14183	On contiguous sides of the body
		2224/145	Material

2224/14505	. . . . .	Bump connectors having different materials	2224/16146	. . . . .	the bump connector connecting to a via connection in the semiconductor or solid-state body
2224/1451	. . . . .	Function	2224/16147	. . . . .	the bump connector connecting to a bonding area disposed in a recess of the surface
2224/14515	. . . . .	Bump connectors having different functions	2224/16148	. . . . .	the bump connector connecting to a bonding area protruding from the surface
2224/14517	. . . . .	including bump connectors providing primarily mechanical bonding	2224/16151	. . . . .	the bump connector connecting between a semiconductor or solid-state body and an item not being a semiconductor or solid-state body, e.g. chip-to-substrate, chip-to-passive
2224/14519	. . . . .	including bump connectors providing primarily thermal dissipation	2224/16153	. . . . .	the body and the item being arranged next to each other, e.g. on a common substrate
2224/15	. . .	Structure, shape, material or disposition of the bump connectors after the connecting process	2224/16155	. . . . .	the item being non-metallic, e.g. being an insulating substrate with or without metallisation
2224/16	. . . .	of an individual bump connector	2224/16157	. . . . .	the bump connector connecting to a bond pad of the item
2224/1601	. . . . .	Structure	2224/1616	. . . . .	the bump connector connecting to a pin of the item
2224/16012	. . . . .	relative to the bonding area, e.g. bond pad	2224/16163	. . . . .	the bump connector connecting to a potential ring of the item
2224/16013	. . . . .	the bump connector being larger than the bonding area, e.g. bond pad	2224/16165	. . . . .	the bump connector connecting to a via metallisation of the item
2224/16014	. . . . .	the bump connector being smaller than the bonding area, e.g. bond pad	2224/16167	. . . . .	the bump connector connecting to a bonding area disposed in a recess of the surface of the item
2224/1605	. . . . .	Shape	2224/16168	. . . . .	the bump connector connecting to a bonding area protruding from the surface of the item
2224/16052	. . . . .	in top view	2224/16175	. . . . .	the item being metallic
2224/16054	. . . . .	being rectangular or square	2224/16183	. . . . .	the bump connector connecting to a potential ring of the item
2224/16055	. . . . .	being circular or elliptic	2224/16187	. . . . .	the bump connector connecting to a bonding area disposed in a recess of the surface of the item
2224/16056	. . . . .	comprising protrusions or indentations	2224/16188	. . . . .	the bump connector connecting to a bonding area protruding from the surface of the item
2224/16057	. . . . .	in side view	2224/16195	. . . . .	the item being a discrete passive component
2224/16058	. . . . .	being non uniform along the bump connector	2224/16197	. . . . .	the bump connector connecting to a bonding area disposed in a recess of the surface of the item
2224/16059	. . . . .	comprising protrusions or indentations	2224/16198	. . . . .	the bump connector connecting to a bonding area protruding from the surface of the item
2224/1607	. . . . .	of bonding interfaces, e.g. interlocking features	2224/16221	. . . . .	the body and the item being stacked
2224/161	. . . . .	Disposition	2224/16225	. . . . .	the item being non-metallic, e.g. insulating substrate with or without metallisation
2224/16104	. . . . .	relative to the bonding area, e.g. bond pad	2224/16227	. . . . .	the bump connector connecting to a bond pad of the item
2224/16105	. . . . .	the bump connector connecting bonding areas being not aligned with respect to each other	2224/1623	. . . . .	the bump connector connecting to a pin of the item
2224/16106	. . . . .	the bump connector connecting one bonding area to at least two respective bonding areas	2224/16233	. . . . .	the bump connector connecting to a potential ring of the item
2224/16108	. . . . .	the bump connector not being orthogonal to the surface	2224/16235	. . . . .	the bump connector connecting to a via metallisation of the item
2224/16111	. . . . .	the bump connector being disposed in a recess of the surface			
2224/16112	. . . . .	the bump connector being at least partially embedded in the surface			
2224/16113	. . . . .	the whole bump connector protruding from the surface			
2224/1613	. . . . .	the bump connector connecting within a semiconductor or solid-state body, i.e. connecting two bonding areas on the same semiconductor or solid-state body			
2224/16135	. . . . .	the bump connector connecting between different semiconductor or solid-state bodies, i.e. chip-to-chip			
2224/16137	. . . . .	the bodies being arranged next to each other, e.g. on a common substrate			
2224/16141	. . . . .	the bodies being arranged on opposite sides of a substrate, e.g. mirror arrangements			
2224/16145	. . . . .	the bodies being stacked			

2224/16237	. . . . .	the bump connector connecting to a bonding area disposed in a recess of the surface of the item	2224/17133	. . . . .	with a staggered arrangement, e.g. depopulated array
2224/16238	. . . . .	the bump connector connecting to a bonding area protruding from the surface of the item	2224/17134	. . . . .	covering only portions of the surface to be connected
2224/1624	. . . . .	the bump connector connecting between the body and an opposite side of the item with respect to the body	2224/17135	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/16245	. . . . .	the item being metallic	2224/17136	. . . . .	Covering only the central area of the surface to be connected, i.e. central arrangements
2224/16253	. . . . .	the bump connector connecting to a potential ring of the item	2224/1714	. . . . .	Circular array, i.e. array with radial symmetry
2224/16257	. . . . .	the bump connector connecting to a bonding area disposed in a recess of the surface of the item	2224/17142	. . . . .	being non uniform, i.e. having a non uniform pitch across the array
2224/16258	. . . . .	the bump connector connecting to a bonding area protruding from the surface of the item	2224/17143	. . . . .	with a staggered arrangement
2224/1626	. . . . .	the bump connector connecting between the body and an opposite side of the item with respect to the body	2224/17144	. . . . .	covering only portions of the surface to be connected
2224/16265	. . . . .	the item being a discrete passive component	2224/17145	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/16267	. . . . .	the bump connector connecting to a bonding area disposed in a recess of the surface of the item	2224/17146	. . . . .	Covering only the central area of the surface to be connected, i.e. central arrangements
2224/16268	. . . . .	the bump connector connecting to a bonding area protruding from the surface of the item	2224/1715	. . . . .	Mirror array, i.e. array having only a reflection symmetry, i.e. bilateral symmetry
2224/165	. . . . .	Material	2224/17151	. . . . .	being uniform, i.e. having a uniform pitch across the array
2224/16501	. . . . .	at the bonding interface	2224/17152	. . . . .	being non uniform, i.e. having a non uniform pitch across the array
2224/16502	. . . . .	comprising an eutectic alloy	2224/17153	. . . . .	with a staggered arrangement, e.g. depopulated array
2224/16503	. . . . .	comprising an intermetallic compound	2224/17154	. . . . .	covering only portions of the surface to be connected
2224/16505	. . . . .	outside the bonding interface, e.g. in the bulk of the bump connector	2224/17155	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/16506	. . . . .	comprising an eutectic alloy	2224/17156	. . . . .	Covering only the central area of the surface to be connected, i.e. central arrangements
2224/16507	. . . . .	comprising an intermetallic compound	2224/1716	. . . . .	Random layout, i.e. layout with no symmetry
2224/17	. . . . .	of a plurality of bump connectors	2224/17163	. . . . .	with a staggered arrangement
2224/1701	. . . . .	Structure	2224/17164	. . . . .	covering only portions of the surface to be connected
2224/1703	. . . . .	Bump connectors having different sizes, e.g. different diameters, heights or widths	2224/17165	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/1705	. . . . .	Shape	2224/17166	. . . . .	Covering only the central area of the surface to be connected, i.e. central arrangements
2224/17051	. . . . .	Bump connectors having different shapes	2224/17177	. . . . .	Combinations of arrays with different layouts
2224/17055	. . . . .	of their bonding interfaces	2224/17179	. . . . .	Corner adaptations, i.e. disposition of the bump connectors at the corners of the semiconductor or solid-state body
2224/171	. . . . .	Disposition	2224/1718	. . . . .	being disposed on at least two different sides of the body, e.g. dual array
2224/17104	. . . . .	relative to the bonding areas, e.g. bond pads	2224/17181	. . . . .	On opposite sides of the body
2224/17106	. . . . .	the bump connectors being bonded to at least one common bonding area	2224/17183	. . . . .	On contiguous sides of the body
2224/17107	. . . . .	the bump connectors connecting two common bonding areas	2224/175	. . . . .	Material
2224/1712	. . . . .	Layout (layout of bump connectors prior to the connecting process H01L 2224/1412)	2224/17505	. . . . .	Bump connectors having different materials
2224/1713	. . . . .	Square or rectangular array	2224/1751	. . . . .	Function
2224/17132	. . . . .	being non uniform, i.e. having a non uniform pitch across the array			

2224/17515	. . . . .	Bump connectors having different functions	2224/24147	. . . . .	the HDI interconnect not connecting to the same level of the lower semiconductor or solid-state body at which the upper semiconductor or solid-state body is mounted, e.g. the upper semiconductor or solid-state body being mounted in a cavity or on a protrusion of the lower semiconductor or solid-state body
2224/17517	. . . . .	including bump connectors providing primarily mechanical support	2224/24151	. . . . .	Connecting between a semiconductor or solid-state body and an item not being a semiconductor or solid-state body, e.g. chip-to-substrate, chip-to-passive
2224/17519	. . . . .	including bump connectors providing primarily thermal dissipation	2224/24153	. . . . .	the body and the item being arranged next to each other, e.g. on a common substrate
2224/18	. .	High density interconnect [HDI] connectors; Manufacturing methods related thereto	2224/24155	. . . . .	the item being non-metallic, e.g. insulating substrate with or without metallisation
2224/19	. . .	Manufacturing methods of high density interconnect preforms	2224/24175	. . . . .	the item being metallic
2224/20	. . .	Structure, shape, material or disposition of high density interconnect preforms	2224/24195	. . . . .	the item being a discrete passive component
2224/21	. . . .	of an individual HDI interconnect	2224/24221	. . . . .	the body and the item being stacked
2224/2101	. . . . .	Structure	2224/24225	. . . . .	the item being non-metallic, e.g. insulating substrate with or without metallisation
2224/2105	. . . . .	Shape	2224/24226	. . . . .	the HDI interconnect connecting to the same level of the item at which the semiconductor or solid-state body is mounted, e.g. the item being planar
2224/211	. . . . .	Disposition	2224/24227	. . . . .	the HDI interconnect not connecting to the same level of the item at which the semiconductor or solid-state body is mounted, e.g. the semiconductor or solid-state body being mounted in a cavity or on a protrusion of the item
2224/214	. . . . .	Connecting portions	2224/24245	. . . . .	the item being metallic
2224/215	. . . . .	Material	2224/24246	. . . . .	the HDI interconnect connecting to the same level of the item at which the semiconductor or solid-state body is mounted, e.g. the item being planar
2224/22	. . . .	of a plurality of HDI interconnects	2224/24247	. . . . .	the HDI interconnect not connecting to the same level of the item at which the semiconductor or solid-state body is mounted, e.g. the semiconductor or solid-state body being mounted in a cavity or on a protrusion of the item
2224/2201	. . . . .	Structure	2224/24265	. . . . .	the item being a discrete passive component
2224/2205	. . . . .	Shape	2224/244	. . . . .	Connecting portions
2224/221	. . . . .	Disposition	2224/245	. . . . .	Material
2224/224	. . . . .	Connecting portions	2224/2499	. . . . .	Auxiliary members for HDI interconnects, e.g. spacers, alignment aids
2224/225	. . . . .	Material	2224/24991	. . . . .	being formed on the semiconductor or solid-state body to be connected
2224/22505	. . . . .	HDI interconnects having different materials	2224/24992	. . . . .	Flow barrier
2224/23	. . .	Structure, shape, material or disposition of the high density interconnect connectors after the connecting process			
2224/24	. . . .	of an individual high density interconnect connector			
2224/2401	. . . . .	Structure			
2224/24011	. . . . .	Deposited, e.g. MCM-D type			
2224/2402	. . . . .	Laminated, e.g. MCM-L type			
2224/2405	. . . . .	Shape			
2224/24051	. . . . .	Conformal with the semiconductor or solid-state device			
2224/241	. . . . .	Disposition			
2224/24101	. . . . .	Connecting bonding areas at the same height			
2224/24105	. . . . .	Connecting bonding areas at different heights			
2224/2413	. . . . .	Connecting within a semiconductor or solid-state body			
2224/24135	. . . . .	Connecting between different semiconductor or solid-state bodies, i.e. chip-to-chip			
2224/24137	. . . . .	the bodies being arranged next to each other, e.g. on a common substrate			
2224/24141	. . . . .	the bodies being arranged on opposite sides of a substrate, e.g. mirror arrangements			
2224/24145	. . . . .	the bodies being stacked			
2224/24146	. . . . .	the HDI interconnect connecting to the same level of the lower semiconductor or solid-state body at which the upper semiconductor or solid-state body is mounted			

2224/24996	. . . . .	being formed on an item to be connected not being a semiconductor or solid-state body	2224/27011	. . . .	Involving a permanent auxiliary member, i.e. a member which is left at least partly in the finished device, e.g. coating, dummy feature
2224/24997	. . . . .	Flow barrier	2224/27013	. . . . .	for holding or confining the layer connector, e.g. solder flow barrier
2224/24998	. . . . .	Reinforcing structures, e.g. ramp-like support	2224/27015	. . . . .	for aligning the layer connector, e.g. marks, spacers
2224/25	. . . . .	of a plurality of high density interconnect connectors	2224/27019	. . . . .	for protecting parts during the process
2224/2501	. . . . .	Structure	2224/271	. . . .	Manufacture and pre-treatment of the layer connector preform
2224/2505	. . . . .	Shape	2224/2711	. . . . .	Shaping
2224/251	. . . . .	Disposition	2224/2712	. . . . .	Applying permanent coating
2224/25105	. . . . .	Connecting at different heights	2224/273	. . . .	by local deposition of the material of the layer connector
2224/2511	. . . . .	the connectors being bonded to at least one common bonding area	2224/2731	. . . . .	in liquid form
2224/25111	. . . . .	the connectors connecting two common bonding areas	2224/27312	. . . . .	Continuous flow, e.g. using a microsyringe, a pump, a nozzle or extrusion
2224/25112	. . . . .	the connectors connecting a common bonding area on the semiconductor or solid-state body to different bonding areas outside the body	2224/27318	. . . . .	by dispensing droplets
2224/25113	. . . . .	the connectors connecting different bonding areas on the semiconductor or solid-state body to a common bonding area outside the body	2224/2732	. . . . .	Screen printing, i.e. using a stencil
2224/2512	. . . . .	Layout	2224/2733	. . . . .	in solid form
2224/25171	. . . . .	Fan-out arrangements	2224/27332	. . . . .	using a powder
2224/25174	. . . . .	Stacked arrangements	2224/27334	. . . . .	using preformed layer
2224/25175	. . . . .	Parallel arrangements	2224/274	. . . .	by blanket deposition of the material of the layer connector
2224/25177	. . . . .	Combinations of a plurality of arrangements	2224/2741	. . . . .	in liquid form
2224/2518	. . . . .	being disposed on at least two different sides of the body, e.g. dual array	2224/27416	. . . . .	Spin coating
2224/254	. . . . .	Connecting portions	2224/27418	. . . . .	Spray coating
2224/2541	. . . . .	the connecting portions being stacked	2224/2742	. . . . .	Curtain coating
2224/2543	. . . . .	the connecting portions being staggered	2224/27422	. . . . .	by dipping, e.g. in a solder bath (hot-dipping C23C 2/00)
2224/255	. . . . .	Material	2224/27424	. . . . .	Immersion coating, e.g. in a solder bath (immersion processes C23C 2/00)
2224/26	. .	Layer connectors, e.g. plate connectors, solder or adhesive layers; Manufacturing methods related thereto	2224/27426	. . . . .	Chemical solution deposition [CSD], i.e. using a liquid precursor
2224/2612	. . .	Auxiliary members for layer connectors, e.g. spacers	2224/27428	. . . . .	Wave coating
2224/26122	. . . .	being formed on the semiconductor or solid-state body to be connected	2224/2743	. . . . .	in solid form
2224/26125	. . . . .	Reinforcing structures	2224/27436	. . . . .	Lamination of a preform, e.g. foil, sheet or layer
2224/26135	. . . . .	Alignment aids	2224/27438	. . . . .	the preform being at least partly pre-patterned
2224/26145	. . . . .	Flow barriers	2224/2744	. . . . .	by transfer printing
2224/26152	. . . .	being formed on an item to be connected not being a semiconductor or solid-state body	2224/27442	. . . . .	using a powder
2224/26155	. . . . .	Reinforcing structures	2224/27444	. . . . .	in gaseous form
2224/26165	. . . . .	Alignment aids	2224/2745	. . . . .	Physical vapour deposition [PVD], e.g. evaporation, or sputtering
2224/26175	. . . . .	Flow barriers	2224/27452	. . . . .	Chemical vapour deposition [CVD], e.g. laser CVD
2224/27	. . .	Manufacturing methods	2224/2746	. . . . .	Plating
2224/27001	. . . .	Involving a temporary auxiliary member not forming part of the manufacturing apparatus, e.g. removable or sacrificial coating, film or substrate	2224/27462	. . . . .	Electroplating
2224/27002	. . . . .	for supporting the semiconductor or solid-state body	2224/27464	. . . . .	Electroless plating
2224/27003	. . . . .	for holding or transferring the layer preform	2224/27466	. . . . .	Conformal deposition, i.e. blanket deposition of a conformal layer on a patterned surface
2224/27005	. . . . .	for aligning the layer connector, e.g. marks, spacers	2224/2747	. . . . .	using a lift-off mask
2224/27009	. . . . .	for protecting parts during manufacture	2224/27472	. . . . .	Profile of the lift-off mask
			2224/27474	. . . . .	Multilayer masks
			2224/2748	. . . . .	Permanent masks, i.e. masks left in the finished device, e.g. passivation layers
			2224/275	. . . .	by chemical or physical modification of a pre-existing or pre-deposited material
			2224/27502	. . . . .	Pre-existing or pre-deposited material
			2224/27505	. . . . .	Sintering

2224/2751	. . . . .	Anodisation	2224/279	. . . . .	Methods of manufacturing layer connectors involving a specific sequence of method steps
2224/27515	. . . . .	Curing and solidification, e.g. of a photosensitive layer material	2224/27901	. . . . .	with repetition of the same manufacturing step
2224/2752	. . . . .	Self-assembly, e.g. self-agglomeration of the layer material in a fluid	2224/27902	. . . . .	Multiple masking steps
2224/27522	. . . . .	Auxiliary means therefor, e.g. for self-assembly activation	2224/27903	. . . . .	using different masks
2224/27524	. . . . .	with special adaptation of the surface or of an auxiliary substrate, e.g. surface shape specially adapted for the self-assembly process	2224/27906	. . . . .	with modification of the same mask
2224/27526	. . . . .	involving the material of the bonding area, e.g. bonding pad	2224/2791	. . . . .	Forming a passivation layer after forming the layer connector
2224/2755	. . . . .	Selective modification	2224/27912	. . . . .	the layer being used as a mask for patterning other parts
2224/27552	. . . . .	using a laser or a focussed ion beam [FIB]	2224/27916	. . . . .	a passivation layer being used as a mask for patterning other parts
2224/27554	. . . . .	Stereolithography, i.e. solidification of a pattern defined by a laser trace in a photosensitive resin	2224/28	. . . . .	Structure, shape, material or disposition of the layer connectors prior to the connecting process
2224/276	. . . . .	by patterning a pre-deposited material (treatment of parts prior to assembly of the devices H01L 21/48)	2224/28105	. . . . .	Layer connectors formed on an encapsulation of the semiconductor or solid-state body, e.g. layer connectors on chip-scale packages
2224/27602	. . . . .	Mechanical treatment, e.g. polishing, grinding	2224/29	. . . . .	of an individual layer connector
2224/2761	. . . . .	Physical or chemical etching	2224/29001	. . . . .	Core members of the layer connector
2224/27612	. . . . .	by physical means only	2224/29005	. . . . .	Structure
2224/27614	. . . . .	by chemical means only	2224/29006	. . . . .	Layer connector larger than the underlying bonding area
2224/27616	. . . . .	Chemical mechanical polishing [CMP]	2224/29007	. . . . .	Layer connector smaller than the underlying bonding area
2224/27618	. . . . .	with selective exposure, development and removal of a photosensitive layer material, e.g. of a photosensitive conductive resin	2224/29008	. . . . .	Layer connector integrally formed with a redistribution layer on the semiconductor or solid-state body
2224/2762	. . . . .	using masks	2224/29009	. . . . .	Layer connector integrally formed with a via connection of the semiconductor or solid-state body
2224/27622	. . . . .	Photolithography	2224/2901	. . . . .	Shape
2224/2763	. . . . .	using a laser or a focused ion beam [FIB]	2224/29011	. . . . .	comprising apertures or cavities
2224/27632	. . . . .	Ablation by means of a laser or focused ion beam [FIB]	2224/29012	. . . . .	in top view
2224/277	. . . . .	involving monitoring, e.g. feedback loop	2224/29013	. . . . .	being rectangular or square
2224/278	. . . . .	Post-treatment of the layer connector	2224/29014	. . . . .	being circular or elliptic
2224/2781	. . . . .	Cleaning, e.g. oxide removal step, desmearing	2224/29015	. . . . .	comprising protrusions or indentations
2224/2782	. . . . .	Applying permanent coating, e.g. in-situ coating	2224/29016	. . . . .	in side view
2224/27821	. . . . .	Spray coating	2224/29017	. . . . .	being non uniform along the layer connector
2224/27822	. . . . .	by dipping, e.g. in a solder bath	2224/29018	. . . . .	comprising protrusions or indentations
2224/27823	. . . . .	Immersion coating, e.g. in a solder bath	2224/29019	. . . . .	at the bonding interface of the layer connector, i.e. on the surface of the layer connector
2224/27824	. . . . .	Chemical solution deposition [CSD], i.e. using a liquid precursor	2224/2902	. . . . .	Disposition
2224/27825	. . . . .	Plating, e.g. electroplating, electroless plating	2224/29021	. . . . .	the layer connector being disposed in a recess of the surface (embedded layer connector H01L 2224/29022)
2224/27826	. . . . .	Physical vapour deposition [PVD], e.g. evaporation, or sputtering	2224/29022	. . . . .	the layer connector being at least partially embedded in the surface
2224/27827	. . . . .	Chemical vapour deposition [CVD], e.g. laser CVD	2224/29023	. . . . .	the whole layer connector protruding from the surface
2224/2783	. . . . .	Reworking, e.g. shaping (reflowing H01L 2224/27849)	2224/29024	. . . . .	the layer connector being disposed on a redistribution layer on the semiconductor or solid-state body
2224/27831	. . . . .	involving a chemical process, e.g. etching the layer connector	2224/29025	. . . . .	the layer connector being disposed on a via connection of the semiconductor or solid-state body
2224/2784	. . . . .	involving a mechanical process, e.g. planarising the layer connector	2224/29026	. . . . .	relative to the bonding area, e.g. bond pad, of the semiconductor or solid-state body
2224/27845	. . . . .	Chemical mechanical polishing [CMP]			
2224/27848	. . . . .	Thermal treatments, e.g. annealing, controlled cooling			
2224/27849	. . . . .	Reflowing			

2224/29027	the layer connector being offset with respect to the bonding area, e.g. bond pad	2224/29155	Nickel [Ni] as principal constituent
2224/29028	the layer connector being disposed on at least two separate bonding areas, e.g. bond pads	2224/29157	Cobalt [Co] as principal constituent
2224/29034	the layer connector covering only portions of the surface to be connected	2224/2916	Iron [Fe] as principal constituent
2224/29035	covering only the peripheral area of the surface to be connected	2224/29163	the principal constituent melting at a temperature of greater than 1550°C
2224/29036	covering only the central area of the surface to be connected	2224/29164	Palladium [Pd] as principal constituent
2224/29075	Plural core members	2224/29166	Titanium [Ti] as principal constituent
2224/29076	being mutually engaged together, e.g. through inserts	2224/29169	Platinum [Pt] as principal constituent
2224/29078	being disposed next to each other, e.g. side-to-side arrangements	2224/2917	Zirconium [Zr] as principal constituent
2224/2908	being stacked	2224/29171	Chromium [Cr] as principal constituent
2224/29082	Two-layer arrangements	2224/29172	Vanadium [V] as principal constituent
2224/29083	Three-layer arrangements	2224/29173	Rhodium [Rh] as principal constituent
2224/29084	Four-layer arrangements	2224/29176	Ruthenium [Ru] as principal constituent
2224/29099	Material	2224/29178	Iridium [Ir] as principal constituent
2224/291	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/29179	Niobium [Nb] as principal constituent
2224/29101	the principal constituent melting at a temperature of less than 400°C	2224/2918	Molybdenum [Mo] as principal constituent
2224/29105	Gallium [Ga] as principal constituent	2224/29181	Tantalum [Ta] as principal constituent
2224/29109	Indium [In] as principal constituent	2224/29183	Rhenium [Re] as principal constituent
2224/29111	Tin [Sn] as principal constituent	2224/29184	Tungsten [W] as principal constituent
2224/29113	Bismuth [Bi] as principal constituent	2224/29186	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/29114	Thallium [Tl] as principal constituent	2224/29187	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/29188)
2224/29116	Lead [Pb] as principal constituent	2224/29188	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/29117	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/2919	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/29118	Zinc [Zn] as principal constituent	2224/29191	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/2912	Antimony [Sb] as principal constituent	2224/29193	with a principal constituent of the material being a solid not provided for in groups H01L 2224/291 - H01L 2224/29191 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/29123	Magnesium [Mg] as principal constituent	2224/29194	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/291 - H01L 2224/29191
2224/29124	Aluminium [Al] as principal constituent	2224/29195	with a principal constituent of the material being a gas not provided for in groups H01L 2224/291 - H01L 2224/29191
2224/29138	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C		
2224/29139	Silver [Ag] as principal constituent		
2224/29144	Gold [Au] as principal constituent		
2224/29147	Copper [Cu] as principal constituent		
2224/29149	Manganese [Mn] as principal constituent		

2224/29198	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/29266	Titanium [Ti] as principal constituent
2224/29199	Material of the matrix	2224/29269	Platinum [Pt] as principal constituent
2224/292	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/2927	Zirconium [Zr] as principal constituent
2224/29201	the principal constituent melting at a temperature of less than 400°C	2224/29271	Chromium [Cr] as principal constituent
2224/29205	Gallium [Ga] as principal constituent	2224/29272	Vanadium [V] as principal constituent
2224/29209	Indium [In] as principal constituent	2224/29273	Rhodium [Rh] as principal constituent
2224/29211	Tin [Sn] as principal constituent	2224/29276	Ruthenium [Ru] as principal constituent
2224/29213	Bismuth [Bi] as principal constituent	2224/29278	Iridium [Ir] as principal constituent
2224/29214	Thallium [Tl] as principal constituent	2224/29279	Niobium [Nb] as principal constituent
2224/29216	Lead [Pb] as principal constituent	2224/2928	Molybdenum [Mo] as principal constituent
2224/29217	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/29281	Tantalum [Ta] as principal constituent
2224/29218	Zinc [Zn] as principal constituent	2224/29283	Rhenium [Re] as principal constituent
2224/2922	Antimony [Sb] as principal constituent	2224/29284	Tungsten [W] as principal constituent
2224/29223	Magnesium [Mg] as principal constituent	2224/29286	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/29224	Aluminium [Al] as principal constituent	2224/29287	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/29288)
2224/29238	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/29288	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/29239	Silver [Ag] as principal constituent	2224/2929	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/29244	Gold [Au] as principal constituent	2224/29291	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/29247	Copper [Cu] as principal constituent	2224/29293	with a principal constituent of the material being a solid not provided for in groups H01L 2224/292 - H01L 2224/29291 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/29249	Manganese [Mn] as principal constituent	2224/29294	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/292 - H01L 2224/29291
2224/29255	Nickel [Ni] as principal constituent	2224/29295	with a principal constituent of the material being a gas not provided for in groups H01L 2224/292 - H01L 2224/29291
2224/29257	Cobalt [Co] as principal constituent	2224/29298	Fillers
2224/2926	Iron [Fe] as principal constituent	2224/29299	Base material
2224/29263	the principal constituent melting at a temperature of greater than 1550°C		
2224/29264	Palladium [Pd] as principal constituent		

2224/293	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/29371	Chromium [Cr] as principal constituent
2224/29301	the principal constituent melting at a temperature of less than 400°C	2224/29372	Vanadium [V] as principal constituent
2224/29305	Gallium [Ga] as principal constituent	2224/29373	Rhodium [Rh] as principal constituent
2224/29309	Indium [In] as principal constituent	2224/29376	Ruthenium [Ru] as principal constituent
2224/29311	Tin [Sn] as principal constituent	2224/29378	Iridium [Ir] as principal constituent
2224/29313	Bismuth [Bi] as principal constituent	2224/29379	Niobium [Nb] as principal constituent
2224/29314	Thallium [Tl] as principal constituent	2224/2938	Molybdenum [Mo] as principal constituent
2224/29316	Lead [Pb] as principal constituent	2224/29381	Tantalum [Ta] as principal constituent
2224/29317	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/29383	Rhenium [Re] as principal constituent
2224/29318	Zinc [Zn] as principal constituent	2224/29384	Tungsten [W] as principal constituent
2224/2932	Antimony [Sb] as principal constituent	2224/29386	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/29323	Magnesium [Mg] as principal constituent	2224/29387	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/29388)
2224/29324	Aluminium [Al] as principal constituent	2224/29388	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/29338	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/2939	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/29339	Silver [Ag] as principal constituent	2224/29391	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/29344	Gold [Au] as principal constituent	2224/29393	with a principal constituent of the material being a solid not provided for in groups H01L 2224/293 - H01L 2224/29391 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/29347	Copper [Cu] as principal constituent	2224/29394	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/293 - H01L 2224/29391
2224/29349	Manganese [Mn] as principal constituent	2224/29395	with a principal constituent of the material being a gas not provided for in groups H01L 2224/293 - H01L 2224/29391
2224/29355	Nickel [Ni] as principal constituent	2224/29398	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/29357	Cobalt [Co] as principal constituent	2224/29399	Coating material
2224/2936	Iron [Fe] as principal constituent		
2224/29363	the principal constituent melting at a temperature of greater than 1550°C		
2224/29364	Palladium [Pd] as principal constituent		
2224/29366	Titanium [Ti] as principal constituent		
2224/29369	Platinum [Pt] as principal constituent		
2224/2937	Zirconium [Zr] as principal constituent		

2224/294	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/29471	Chromium [Cr] as principal constituent
2224/29401	the principal constituent melting at a temperature of less than 400°C	2224/29472	Vanadium [V] as principal constituent
2224/29405	Gallium [Ga] as principal constituent	2224/29473	Rhodium [Rh] as principal constituent
2224/29409	Indium [In] as principal constituent	2224/29476	Ruthenium [Ru] as principal constituent
2224/29411	Tin [Sn] as principal constituent	2224/29478	Iridium [Ir] as principal constituent
2224/29413	Bismuth [Bi] as principal constituent	2224/29479	Niobium [Nb] as principal constituent
2224/29414	Thallium [Tl] as principal constituent	2224/2948	Molybdenum [Mo] as principal constituent
2224/29416	Lead [Pb] as principal constituent	2224/29481	Tantalum [Ta] as principal constituent
2224/29417	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/29483	Rhenium [Re] as principal constituent
2224/29418	Zinc [Zn] as principal constituent	2224/29484	Tungsten [W] as principal constituent
2224/2942	Antimony [Sb] as principal constituent	2224/29486	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/29423	Magnesium [Mg] as principal constituent	2224/29487	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/29488)
2224/29424	Aluminium [Al] as principal constituent	2224/29488	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/29438	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/2949	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/29439	Silver [Ag] as principal constituent	2224/29491	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/29444	Gold [Au] as principal constituent	2224/29493	with a principal constituent of the material being a solid not provided for in groups H01L 2224/294 - H01L 2224/29491 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/29447	Copper [Cu] as principal constituent	2224/29494	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/294 - H01L 2224/29491
2224/29449	Manganese [Mn] as principal constituent	2224/29495	with a principal constituent of the material being a gas not provided for in groups H01L 2224/294 - H01L 2224/29491
2224/29455	Nickel [Ni] as principal constituent	2224/29498	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/29457	Cobalt [Co] as principal constituent	2224/29499	Shape or distribution of the fillers
2224/2946	Iron [Fe] as principal constituent	2224/2954	Coating
2224/29463	the principal constituent melting at a temperature of greater than 1550°C	2224/29541	Structure
2224/29464	Palladium [Pd] as principal constituent	2224/2955	Shape
2224/29466	Titanium [Ti] as principal constituent	2224/29551	being non uniform
2224/29469	Platinum [Pt] as principal constituent		
2224/2947	Zirconium [Zr] as principal constituent		

2224/29552	comprising protrusions or indentations	2224/29644	Gold [Au] as principal constituent
2224/29553	at the bonding interface of the layer connector, i.e. on the surface of the layer connector	2224/29647	Copper [Cu] as principal constituent
2224/29556	Disposition	2224/29649	Manganese [Mn] as principal constituent
2224/29561	On the entire surface of the core, i.e. integral coating	2224/29655	Nickel [Ni] as principal constituent
2224/29562	On the entire exposed surface of the core	2224/29657	Cobalt [Co] as principal constituent
2224/29563	Only on parts of the surface of the core, i.e. partial coating	2224/2966	Iron [Fe] as principal constituent
2224/29564	Only on the bonding interface of the layer connector	2224/29663	the principal constituent melting at a temperature of greater than 1550°C
2224/29565	Only outside the bonding interface of the layer connector	2224/29664	Palladium [Pd] as principal constituent
2224/29566	Both on and outside the bonding interface of the layer connector	2224/29666	Titanium [Ti] as principal constituent
2224/2957	Single coating layer	2224/29669	Platinum [Pt] as principal constituent
2224/29575	Plural coating layers	2224/2967	Zirconium [Zr] as principal constituent
2224/29576	being mutually engaged together, e.g. through inserts	2224/29671	Chromium [Cr] as principal constituent
2224/29578	being disposed next to each other, e.g. side-to-side arrangements	2224/29672	Vanadium [V] as principal constituent
2224/2958	being stacked	2224/29673	Rhodium [Rh] as principal constituent
2224/29582	Two-layer coating	2224/29676	Ruthenium [Ru] as principal constituent
2224/29583	Three-layer coating	2224/29678	Iridium [Ir] as principal constituent
2224/29584	Four-layer coating	2224/29679	Niobium [Nb] as principal constituent
2224/29599	Material	2224/2968	Molybdenum [Mo] as principal constituent
2224/296	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/29681	Tantalum [Ta] as principal constituent
2224/29601	the principal constituent melting at a temperature of less than 400°C	2224/29683	Rhenium [Re] as principal constituent
2224/29605	Gallium [Ga] as principal constituent	2224/29684	Tungsten [W] as principal constituent
2224/29609	Indium [In] as principal constituent	2224/29686	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/29611	Tin [Sn] as principal constituent	2224/29687	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/29688)
2224/29613	Bismuth [Bi] as principal constituent	2224/29688	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/29614	Thallium [Tl] as principal constituent	2224/2969	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/29616	Lead [Pb] as principal constituent	2224/29691	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/29617	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/29693	with a principal constituent of the material being a solid not provided for in groups H01L 2224/296 - H01L 2224/29691 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/29618	Zinc [Zn] as principal constituent		
2224/2962	Antimony [Sb] as principal constituent		
2224/29623	Magnesium [Mg] as principal constituent		
2224/29624	Aluminium [Al] as principal constituent		
2224/29638	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C		
2224/29639	Silver [Ag] as principal constituent		

2224/29694	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/296 - H01L 2224/29691	2224/2976	Iron [Fe] as principal constituent
2224/29695	with a principal constituent of the material being a gas not provided for in groups H01L 2224/296 - H01L 2224/29691	2224/29763	the principal constituent melting at a temperature of greater than 1550°C
2224/29698	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/29764	Palladium [Pd] as principal constituent
2224/29699	Material of the matrix	2224/29766	Titanium [Ti] as principal constituent
2224/297	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/29769	Platinum [Pt] as principal constituent
2224/29701	the principal constituent melting at a temperature of less than 400°C	2224/2977	Zirconium [Zr] as principal constituent
2224/29705	Gallium [Ga] as principal constituent	2224/29771	Chromium [Cr] as principal constituent
2224/29709	Indium [In] as principal constituent	2224/29772	Vanadium [V] as principal constituent
2224/29711	Tin [Sn] as principal constituent	2224/29773	Rhodium [Rh] as principal constituent
2224/29713	Bismuth [Bi] as principal constituent	2224/29776	Ruthenium [Ru] as principal constituent
2224/29714	Thallium [Tl] as principal constituent	2224/29778	Iridium [Ir] as principal constituent
2224/29716	Lead [Pb] as principal constituent	2224/29779	Niobium [Nb] as principal constituent
2224/29717	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/2978	Molybdenum [Mo] as principal constituent
2224/29718	Zinc [Zn] as principal constituent	2224/29781	Tantalum [Ta] as principal constituent
2224/2972	Antimony [Sb] as principal constituent	2224/29783	Rhenium [Re] as principal constituent
2224/29723	Magnesium [Mg] as principal constituent	2224/29784	Tungsten [W] as principal constituent
2224/29724	Aluminium [Al] as principal constituent	2224/29786	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/29738	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/29787	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/29788)
2224/29739	Silver [Ag] as principal constituent	2224/29788	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/29744	Gold [Au] as principal constituent	2224/2979	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/29747	Copper [Cu] as principal constituent	2224/29791	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/29749	Manganese [Mn] as principal constituent	2224/29793	with a principal constituent of the material being a solid not provided for in groups H01L 2224/297 - H01L 2224/29791 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/29755	Nickel [Ni] as principal constituent	2224/29794	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/297 - H01L 2224/29791
2224/29757	Cobalt [Co] as principal constituent	2224/29795	with a principal constituent of the material being a gas not provided for in groups H01L 2224/297 - H01L 2224/29791
		2224/29798	Fillers

2224/29799	Base material	2224/29871	Chromium [Cr] as principal constituent
2224/298	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/29872	Vanadium [V] as principal constituent
2224/29801	the principal constituent melting at a temperature of less than 400°C	2224/29873	Rhodium [Rh] as principal constituent
2224/29805	Gallium [Ga] as principal constituent	2224/29876	Ruthenium [Ru] as principal constituent
2224/29809	Indium [In] as principal constituent	2224/29878	Iridium [Ir] as principal constituent
2224/29811	Tin [Sn] as principal constituent	2224/29879	Niobium [Nb] as principal constituent
2224/29813	Bismuth [Bi] as principal constituent	2224/2988	Molybdenum [Mo] as principal constituent
2224/29814	Thallium [Tl] as principal constituent	2224/29881	Tantalum [Ta] as principal constituent
2224/29816	Lead [Pb] as principal constituent	2224/29883	Rhenium [Re] as principal constituent
2224/29817	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/29884	Tungsten [W] as principal constituent
2224/29818	Zinc [Zn] as principal constituent	2224/29886	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/2982	Antimony [Sb] as principal constituent	2224/29887	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/29888)
2224/29823	Magnesium [Mg] as principal constituent	2224/29888	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/29824	Aluminium [Al] as principal constituent	2224/2989	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/29838	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/29891	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/29839	Silver [Ag] as principal constituent	2224/29893	with a principal constituent of the material being a solid not provided for in groups H01L 2224/298 - H01L 2224/29891 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/29844	Gold [Au] as principal constituent	2224/29894	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/298 - H01L 2224/29891
2224/29847	Copper [Cu] as principal constituent	2224/29895	with a principal constituent of the material being a gas not provided for in groups H01L 2224/298 - H01L 2224/29891
2224/29849	Manganese [Mn] as principal constituent	2224/29898	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/29855	Nickel [Ni] as principal constituent	2224/29899	Coating material
2224/29857	Cobalt [Co] as principal constituent		
2224/2986	Iron [Fe] as principal constituent		
2224/29863	the principal constituent melting at a temperature of greater than 1550°C		
2224/29864	Palladium [Pd] as principal constituent		
2224/29866	Titanium [Ti] as principal constituent		
2224/29869	Platinum [Pt] as principal constituent		
2224/2987	Zirconium [Zr] as principal constituent		

2224/299	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/29971	Chromium [Cr] as principal constituent
2224/29901	the principal constituent melting at a temperature of less than 400°C	2224/29972	Vanadium [V] as principal constituent
2224/29905	Gallium [Ga] as principal constituent	2224/29973	Rhodium [Rh] as principal constituent
2224/29909	Indium [In] as principal constituent	2224/29976	Ruthenium [Ru] as principal constituent
2224/29911	Tin [Sn] as principal constituent	2224/29978	Iridium [Ir] as principal constituent
2224/29913	Bismuth [Bi] as principal constituent	2224/29979	Niobium [Nb] as principal constituent
2224/29914	Thallium [Tl] as principal constituent	2224/2998	Molybdenum [Mo] as principal constituent
2224/29916	Lead [Pb] as principal constituent	2224/29981	Tantalum [Ta] as principal constituent
2224/29917	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/29983	Rhenium [Re] as principal constituent
2224/29918	Zinc [Zn] as principal constituent	2224/29984	Tungsten [W] as principal constituent
2224/2992	Antimony [Sb] as principal constituent	2224/29986	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/29923	Magnesium [Mg] as principal constituent	2224/29987	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/29988)
2224/29924	Aluminium [Al] as principal constituent	2224/29988	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/29938	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/2999	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/29939	Silver [Ag] as principal constituent	2224/29991	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/29944	Gold [Au] as principal constituent	2224/29993	with a principal constituent of the material being a solid not provided for in groups H01L 2224/299 - H01L 2224/29991 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/29947	Copper [Cu] as principal constituent	2224/29994	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/299 - H01L 2224/29991
2224/29949	Manganese [Mn] as principal constituent	2224/29995	with a principal constituent of the material being a gas not provided for in groups H01L 2224/299 - H01L 2224/29991
2224/29955	Nickel [Ni] as principal constituent	2224/29998	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/29957	Cobalt [Co] as principal constituent	2224/29999	Shape or distribution of the fillers
2224/2996	Iron [Fe] as principal constituent	2224/30	of a plurality of layer connectors
2224/29963	the principal constituent melting at a temperature of greater than 1550°C	2224/3001	Structure
2224/29964	Palladium [Pd] as principal constituent	2224/3003	Layer connectors having different sizes, e.g. different heights or widths
2224/29966	Titanium [Ti] as principal constituent	2224/3005	Shape
2224/29969	Platinum [Pt] as principal constituent		
2224/2997	Zirconium [Zr] as principal constituent		

2224/30051	. . . . .	Layer connectors having different shapes	2224/30166	. . . . .	Covering only the central area of the surface to be connected, i.e. central arrangements
2224/301	. . . . .	Disposition	2224/30177	. . . . .	Combinations of arrays with different layouts
2224/30104	. . . . .	relative to the bonding areas, e.g. bond pads, of the semiconductor or solid-state body	2224/30179	. . . . .	Corner adaptations, i.e. disposition of the layer connectors at the corners of the semiconductor or solid-state body
2224/30111	. . . . .	the layer connectors being bonded to at least one common bonding area	2224/3018	. . . . .	being disposed on at least two different sides of the body, e.g. dual array
2224/3012	. . . . .	Layout	2224/30181	. . . . .	On opposite sides of the body
2224/3013	. . . . .	Square or rectangular array	2224/30183	. . . . .	On contiguous sides of the body
2224/30131	. . . . .	being uniform, i.e. having a uniform pitch across the array	2224/305	. . . . .	Material
2224/30132	. . . . .	being non uniform, i.e. having a non uniform pitch across the array	2224/30505	. . . . .	Layer connectors having different materials
2224/30133	. . . . .	with a staggered arrangement, e.g. depopulated array	2224/3051	. . . . .	Function
2224/30134	. . . . .	covering only portions of the surface to be connected	2224/30515	. . . . .	Layer connectors having different functions
2224/30135	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/30517	. . . . .	including layer connectors providing primarily mechanical bonding
2224/30136	. . . . .	Covering only the central area of the surface to be connected, i.e. central arrangements	2224/30519	. . . . .	including layer connectors providing primarily thermal dissipation
2224/3014	. . . . .	Circular array, i.e. array with radial symmetry	2224/31	. . . . .	Structure, shape, material or disposition of the layer connectors after the connecting process
2224/30141	. . . . .	being uniform, i.e. having a uniform pitch across the array	2224/32	. . . . .	of an individual layer connector
2224/30142	. . . . .	being non uniform, i.e. having a non uniform pitch across the array	2224/3201	. . . . .	Structure
2224/30143	. . . . .	covering only portions of the surface to be connected	2224/32012	. . . . .	relative to the bonding area, e.g. bond pad
2224/30145	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/32013	. . . . .	the layer connector being larger than the bonding area, e.g. bond pad
2224/30146	. . . . .	Covering only the central area of the surface to be connected, i.e. central arrangements	2224/32014	. . . . .	the layer connector being smaller than the bonding area, e.g. bond pad
2224/3015	. . . . .	Mirror array, i.e. array having only a reflection symmetry, i.e. bilateral symmetry	2224/3205	. . . . .	Shape
2224/30151	. . . . .	being uniform, i.e. having a uniform pitch across the array	2224/32052	. . . . .	in top view
2224/30152	. . . . .	being non uniform, i.e. having a non uniform pitch across the array	2224/32053	. . . . .	being non uniform along the layer connector
2224/30153	. . . . .	with a staggered arrangement, e.g. depopulated array	2224/32054	. . . . .	being rectangular or square
2224/30154	. . . . .	covering only portions of the surface to be connected	2224/32055	. . . . .	being circular or elliptic
2224/30155	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/32056	. . . . .	comprising protrusions or indentations
2224/30156	. . . . .	Covering only the central area of the surface to be connected, i.e. central arrangements	2224/32057	. . . . .	in side view
2224/3016	. . . . .	Random layout, i.e. layout with no symmetry	2224/32058	. . . . .	being non uniform along the layer connector
2224/30163	. . . . .	with a staggered arrangement	2224/32059	. . . . .	comprising protrusions or indentations
2224/30164	. . . . .	covering only portions of the surface to be connected	2224/3207	. . . . .	of bonding interfaces, e.g. interlocking features
2224/30165	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/321	. . . . .	Disposition
			2224/32104	. . . . .	relative to the bonding area, e.g. bond pad
			2224/32105	. . . . .	the layer connector connecting bonding areas being not aligned with respect to each other
			2224/32106	. . . . .	the layer connector connecting one bonding area to at least two respective bonding areas
			2224/32111	. . . . .	the layer connector being disposed in a recess of the surface
			2224/32112	. . . . .	the layer connector being at least partially embedded in the surface
			2224/32113	. . . . .	the whole layer connector protruding from the surface

2224/3213	. . . . .	the layer connector connecting within a semiconductor or solid-state body, i.e. connecting two bonding areas on the same semiconductor or solid-state body	2224/32225	. . . . .	the item being non-metallic, e.g. insulating substrate with or without metallisation
2224/32135	. . . . .	the layer connector connecting between different semiconductor or solid-state bodies, i.e. chip-to-chip	2224/32227	. . . . .	the layer connector connecting to a bond pad of the item
2224/32137	. . . . .	the bodies being arranged next to each other, e.g. on a common substrate	2224/3223	. . . . .	the layer connector connecting to a pin of the item
2224/32141	. . . . .	the bodies being arranged on opposite sides of a substrate, e.g. mirror arrangements	2224/32233	. . . . .	the layer connector connecting to a potential ring of the item
2224/32145	. . . . .	the bodies being stacked	2224/32235	. . . . .	the layer connector connecting to a via metallisation of the item
2224/32146	. . . . .	the layer connector connecting to a via connection in the semiconductor or solid-state body	2224/32237	. . . . .	the layer connector connecting to a bonding area disposed in a recess of the surface of the item
2224/32147	. . . . .	the layer connector connecting to a bonding area disposed in a recess of the surface	2224/32238	. . . . .	the layer connector connecting to a bonding area protruding from the surface of the item
2224/32148	. . . . .	the layer connector connecting to a bonding area protruding from the surface	2224/3224	. . . . .	the layer connector connecting between the body and an opposite side of the item with respect to the body
2224/32151	. . . . .	the layer connector connecting between a semiconductor or solid-state body and an item not being a semiconductor or solid-state body, e.g. chip-to-substrate, chip-to-passive	2224/32245	. . . . .	the item being metallic
2224/32153	. . . . .	the body and the item being arranged next to each other, e.g. on a common substrate	2224/32253	. . . . .	the layer connector connecting to a potential ring of the item
2224/32155	. . . . .	the item being non-metallic, e.g. being an insulating substrate with or without metallisation	2224/32257	. . . . .	the layer connector connecting to a bonding area disposed in a recess of the surface of the item
2224/32157	. . . . .	the layer connector connecting to a bond pad of the item	2224/32258	. . . . .	the layer connector connecting to a bonding area protruding from the surface of the item
2224/3216	. . . . .	the layer connector connecting to a pin of the item	2224/3226	. . . . .	the layer connector connecting between the body and an opposite side of the item with respect to the body
2224/32163	. . . . .	the layer connector connecting to a potential ring of the item	2224/32265	. . . . .	the item being a discrete passive component
2224/32165	. . . . .	the layer connector connecting to a via metallisation of the item	2224/32267	. . . . .	the layer connector connecting to a bonding area disposed in a recess of the surface of the item
2224/32167	. . . . .	the layer connector connecting to a bonding area disposed in a recess of the surface of the item	2224/32268	. . . . .	the layer connector connecting to a bonding area protruding from the surface of the item
2224/32168	. . . . .	the layer connector connecting to a bonding area protruding from the surface of the item	2224/325	. . . . .	Material
2224/32175	. . . . .	the item being metallic	2224/32501	. . . . .	at the bonding interface
2224/32183	. . . . .	the layer connector connecting to a potential ring of the item	2224/32502	. . . . .	comprising an eutectic alloy
2224/32187	. . . . .	the layer connector connecting to a bonding area disposed in a recess of the surface of the item	2224/32503	. . . . .	comprising an intermetallic compound
2224/32188	. . . . .	the layer connector connecting to a bonding area protruding from the surface of the item	2224/32505	. . . . .	outside the bonding interface, e.g. in the bulk of the layer connector
2224/32195	. . . . .	the item being a discrete passive component	2224/32506	. . . . .	comprising an eutectic alloy
2224/32197	. . . . .	the layer connector connecting to a bonding area disposed in a recess of the surface of the item	2224/32507	. . . . .	comprising an intermetallic compound
2224/32198	. . . . .	the layer connector connecting to a bonding area protruding from the surface of the item	2224/33	. . . . .	of a plurality of layer connectors
2224/32221	. . . . .	the body and the item being stacked	2224/3301	. . . . .	Structure
			2224/3303	. . . . .	Layer connectors having different sizes, e.g. different heights or widths
			2224/3305	. . . . .	Shape
			2224/33051	. . . . .	Layer connectors having different shapes
			2224/33055	. . . . .	of their bonding interfaces
			2224/331	. . . . .	Disposition
			2224/33104	. . . . .	relative to the bonding areas, e.g. bond pads

2224/33106	. . . . .	the layer connectors being bonded to at least one common bonding area	2224/3351	. . . . .	Function
2224/33107	. . . . .	the layer connectors connecting two common bonding areas	2224/33515	. . . . .	Layer connectors having different functions
2224/3312	. . . . .	Layout (layout of layer connectors prior to the connecting process H01L 2224/3012)	2224/33517	. . . . .	including layer connectors providing primarily mechanical support
2224/3313	. . . . .	Square or rectangular array	2224/33519	. . . . .	including layer connectors providing primarily thermal dissipation
2224/33132	. . . . .	being non uniform, i.e. having a non uniform pitch across the array	2224/34	. .	Strap connectors, e.g. copper straps for grounding power devices; Manufacturing methods related thereto
2224/33133	. . . . .	with a staggered arrangement, e.g. depopulated array	2224/35	. . .	Manufacturing methods
2224/33134	. . . . .	covering only portions of the surface to be connected	2224/35001	. . . .	Involving a temporary auxiliary member not forming part of the manufacturing apparatus, e.g. removable or sacrificial coating, film or substrate
2224/33135	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/351	. . . .	Pre-treatment of the preform connector
2224/3314	. . . . .	Circular array, i.e. array with radial symmetry	2224/3512	. . . .	Applying permanent coating, e.g. in-situ coating
2224/33142	. . . . .	being non uniform, i.e. having a non uniform pitch across the array	2224/35125	. . . . .	Plating, e.g. electroplating, electroless plating
2224/33143	. . . . .	with a staggered arrangement	2224/352	. . . .	Mechanical processes
2224/33144	. . . . .	covering only portions of the surface to be connected	2224/3521	. . . . .	Pulling
2224/33145	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/355	. . . .	Modification of a pre-existing material
2224/3315	. . . . .	Mirror array, i.e. array having only a reflection symmetry, i.e. bilateral symmetry	2224/3551	. . . . .	Sintering
2224/33151	. . . . .	being uniform, i.e. having a uniform pitch across the array	2224/3552	. . . . .	Anodisation
2224/33152	. . . . .	being non uniform, i.e. having a non uniform pitch across the array	2224/357	. . . .	Involving monitoring, e.g. feedback loop
2224/33153	. . . . .	with a staggered arrangement, e.g. depopulated array	2224/358	. . . .	Post-treatment of the connector
2224/33154	. . . . .	covering only portions of the surface to be connected	2224/3581	. . . . .	Cleaning, e.g. oxide removal step, desmearing
2224/33155	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/3582	. . . . .	Applying permanent coating, e.g. in-situ coating
2224/33156	. . . . .	Covering only the central area of the surface to be connected, i.e. central arrangements	2224/35821	. . . . .	Spray coating
2224/3316	. . . . .	Random layout, i.e. layout with no symmetry	2224/35822	. . . . .	Dip coating
2224/33163	. . . . .	with a staggered arrangement	2224/35823	. . . . .	Immersion coating, e.g. solder bath
2224/33164	. . . . .	covering only portions of the surface to be connected	2224/35824	. . . . .	Chemical solution deposition [CSD], i.e. using a liquid precursor
2224/33165	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/35825	. . . . .	Plating, e.g. electroplating, electroless plating
2224/33177	. . . . .	Combinations of arrays with different layouts	2224/35826	. . . . .	Physical vapour deposition [PVD], e.g. evaporation, sputtering
2224/33179	. . . . .	Corner adaptations, i.e. disposition of the layer connectors at the corners of the semiconductor or solid-state body	2224/35827	. . . . .	Chemical vapour deposition [CVD], e.g. laser CVD
2224/3318	. . . . .	being disposed on at least two different sides of the body, e.g. dual array	2224/3583	. . . . .	Reworking
2224/33181	. . . . .	On opposite sides of the body	2224/35831	. . . . .	with a chemical process, e.g. with etching of the connector
2224/33183	. . . . .	On contiguous sides of the body	2224/35847	. . . . .	with a mechanical process, e.g. with flattening of the connector
2224/335	. . . . .	Material	2224/35848	. . . . .	Thermal treatments, e.g. annealing, controlled cooling
2224/33505	. . . . .	Layer connectors having different materials	2224/35985	. . . .	Methods of manufacturing strap connectors involving a specific sequence of method steps
			2224/35986	. . . . .	with repetition of the same manufacturing step
			2224/36	. . .	Structure, shape, material or disposition of the strap connectors prior to the connecting process
			2224/37	. . . .	of an individual strap connector
			2224/37001	. . . . .	Core members of the connector
			2224/37005	. . . . .	Structure
			2224/3701	. . . . .	Shape
			2224/37011	. . . . .	comprising apertures or cavities
			2224/37012	. . . . .	Cross-sectional shape

2224/37013	being non uniform along the connector	2224/37169	Platinum [Pt] as principal constituent
2224/3702	Disposition	2224/3717	Zirconium [Zr] as principal constituent
2224/37025	Plural core members	2224/37171	Chromium [Cr] as principal constituent
2224/37026	being mutually engaged together, e.g. through inserts	2224/37172	Vanadium [V] as principal constituent
2224/37028	Side-to-side arrangements	2224/37173	Rhodium [Rh] as principal constituent
2224/3703	Stacked arrangements	2224/37176	Ruthenium [Ru] as principal constituent
2224/37032	Two-layer arrangements	2224/37178	Iridium [Ir] as principal constituent
2224/37033	Three-layer arrangements	2224/37179	Niobium [Nb] as principal constituent
2224/37034	Four-layer arrangements	2224/3718	Molybdenum [Mo] as principal constituent
2224/37099	Material	2224/37181	Tantalum [Ta] as principal constituent
2224/371	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/37183	Rhenium [Re] as principal constituent
2224/37101	the principal constituent melting at a temperature of less than 400°C	2224/37184	Tungsten [W] as principal constituent
2224/37105	Gallium [Ga] as principal constituent	2224/37186	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/37109	Indium [In] as principal constituent	2224/37187	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/37188)
2224/37111	Tin [Sn] as principal constituent	2224/37188	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/37113	Bismuth [Bi] as principal constituent	2224/3719	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/37114	Thallium [Tl] as principal constituent	2224/37191	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/37116	Lead [Pb] as principal constituent	2224/37193	with a principal constituent of the material being a solid not provided for in groups H01L 2224/371 - H01L 2224/37191 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/37117	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/37194	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/371 - H01L 2224/37191
2224/37118	Zinc [Zn] as principal constituent	2224/37195	with a principal constituent of the material being a gas not provided for in groups H01L 2224/371 - H01L 2224/37191
2224/3712	Antimony [Sb] as principal constituent	2224/37198	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/37123	Magnesium [Mg] as principal constituent	2224/37199	Material of the matrix
2224/37124	Aluminium [Al] as principal constituent		
2224/37138	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C		
2224/37139	Silver [Ag] as principal constituent		
2224/37144	Gold [Au] as principal constituent		
2224/37147	Copper [Cu] as principal constituent		
2224/37149	Manganese [Mn] as principal constituent		
2224/37155	Nickel [Ni] as principal constituent		
2224/37157	Cobalt [Co] as principal constituent		
2224/3716	Iron [Fe] as principal constituent		
2224/37163	the principal constituent melting at a temperature of greater than 1550°C		
2224/37164	Palladium [Pd] as principal constituent		
2224/37166	Titanium [Ti] as principal constituent		

2224/372	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/37271	Chromium [Cr] as principal constituent
2224/37201	the principal constituent melting at a temperature of less than 400°C	2224/37272	Vanadium [V] as principal constituent
2224/37205	Gallium [Ga] as principal constituent	2224/37273	Rhodium [Rh] as principal constituent
2224/37209	Indium [In] as principal constituent	2224/37276	Ruthenium [Ru] as principal constituent
2224/37211	Tin [Sn] as principal constituent	2224/37278	Iridium [Ir] as principal constituent
2224/37213	Bismuth [Bi] as principal constituent	2224/37279	Niobium [Nb] as principal constituent
2224/37214	Thallium [Tl] as principal constituent	2224/3728	Molybdenum [Mo] as principal constituent
2224/37216	Lead [Pb] as principal constituent	2224/37281	Tantalum [Ta] as principal constituent
2224/37217	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/37283	Rhenium [Re] as principal constituent
2224/37218	Zinc [Zn] as principal constituent	2224/37284	Tungsten [W] as principal constituent
2224/3722	Antimony [Sb] as principal constituent	2224/37286	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/37223	Magnesium [Mg] as principal constituent	2224/37287	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/37288)
2224/37224	Aluminium [Al] as principal constituent	2224/37288	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/37238	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/3729	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/37239	Silver [Ag] as principal constituent	2224/37291	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/37244	Gold [Au] as principal constituent	2224/37293	with a principal constituent of the material being a solid not provided for in groups H01L 2224/372 - H01L 2224/37291 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/37247	Copper [Cu] as principal constituent	2224/37294	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/372 - H01L 2224/37291
2224/37249	Manganese [Mn] as principal constituent	2224/37295	with a principal constituent of the material being a gas not provided for in groups H01L 2224/372 - H01L 2224/37291
2224/37255	Nickel [Ni] as principal constituent	2224/37298	Fillers
2224/37257	Cobalt [Co] as principal constituent	2224/37299	Base material
2224/3726	Iron [Fe] as principal constituent	2224/373	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/37263	the principal constituent melting at a temperature of greater than 1550°C	2224/37301	the principal constituent melting at a temperature of less than 400°C
2224/37264	Palladium [Pd] as principal constituent	2224/37305	Gallium [Ga] as principal constituent
2224/37266	Titanium [Ti] as principal constituent		
2224/37269	Platinum [Pt] as principal constituent		
2224/3727	Zirconium [Zr] as principal constituent		

2224/37309	Indium [In] as principal constituent	2224/3738	Molybdenum [Mo] as principal constituent
2224/37311	Tin [Sn] as principal constituent	2224/37381	Tantalum [Ta] as principal constituent
2224/37313	Bismuth [Bi] as principal constituent	2224/37383	Rhenium [Re] as principal constituent
2224/37314	Thallium [Tl] as principal constituent	2224/37384	Tungsten [W] as principal constituent
2224/37316	Lead [Pb] as principal constituent	2224/37386	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/37317	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/37387	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/37388)
2224/37318	Zinc [Zn] as principal constituent	2224/37388	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/3732	Antimony [Sb] as principal constituent	2224/3739	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/37323	Magnesium [Mg] as principal constituent	2224/37391	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/37324	Aluminium [Al] as principal constituent	2224/37393	with a principal constituent of the material being a solid not provided for in groups H01L 2224/373 - H01L 2224/37391 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/37338	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/37394	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/373 - H01L 2224/37391
2224/37339	Silver [Ag] as principal constituent	2224/37395	with a principal constituent of the material being a gas not provided for in groups H01L 2224/373 - H01L 2224/37391
2224/37344	Gold [Au] as principal constituent	2224/37398	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/37347	Copper [Cu] as principal constituent	2224/37399	Coating material
2224/37349	Manganese [Mn] as principal constituent	2224/374	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/37355	Nickel [Ni] as principal constituent	2224/37401	the principal constituent melting at a temperature of less than 400°C
2224/37357	Cobalt [Co] as principal constituent	2224/37405	Gallium [Ga] as principal constituent
2224/3736	Iron [Fe] as principal constituent	2224/37409	Indium [In] as principal constituent
2224/37363	the principal constituent melting at a temperature of greater than 1550°C	2224/37411	Tin [Sn] as principal constituent
2224/37364	Palladium [Pd] as principal constituent		
2224/37366	Titanium [Ti] as principal constituent		
2224/37369	Platinum [Pt] as principal constituent		
2224/3737	Zirconium [Zr] as principal constituent		
2224/37371	Chromium [Cr] as principal constituent		
2224/37372	Vanadium [V] as principal constituent		
2224/37373	Rhodium [Rh] as principal constituent		
2224/37376	Ruthenium [Ru] as principal constituent		
2224/37378	Iridium [Ir] as principal constituent		
2224/37379	Niobium [Nb] as principal constituent		

2224/37413	Bismuth [Bi] as principal constituent	2224/37483	Rhenium [Re] as principal constituent
2224/37414	Thallium [Tl] as principal constituent	2224/37484	Tungsten [W] as principal constituent
2224/37416	Lead [Pb] as principal constituent	2224/37486	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/37417	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/37487	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/37488)
2224/37418	Zinc [Zn] as principal constituent	2224/37488	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/3742	Antimony [Sb] as principal constituent	2224/3749	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/37423	Magnesium [Mg] as principal constituent	2224/37491	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/37424	Aluminium [Al] as principal constituent	2224/37493	with a principal constituent of the material being a solid not provided for in groups H01L 2224/374 - H01L 2224/37491 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/37438	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/37494	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/374 - H01L 2224/37491
2224/37439	Silver [Ag] as principal constituent	2224/37495	with a principal constituent of the material being a gas not provided for in groups H01L 2224/374 - H01L 2224/37491
2224/37444	Gold [Au] as principal constituent	2224/37498	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/37447	Copper [Cu] as principal constituent	2224/37499	Shape or distribution of the fillers
2224/37449	Manganese [Mn] as principal constituent	2224/3754	Coating
2224/37455	Nickel [Ni] as principal constituent	2224/37541	Structure
2224/37457	Cobalt [Co] as principal constituent	2224/3755	Shape
2224/3746	Iron [Fe] as principal constituent	2224/3756	Disposition, e.g. coating on a part of the core
2224/37463	the principal constituent melting at a temperature of greater than 1550°C	2224/37565	Single coating layer
2224/37464	Palladium [Pd] as principal constituent	2224/3757	Plural coating layers
2224/37466	Titanium [Ti] as principal constituent	2224/37572	Two-layer stack coating
2224/37469	Platinum [Pt] as principal constituent	2224/37573	Three-layer stack coating
2224/3747	Zirconium [Zr] as principal constituent	2224/37574	Four-layer stack coating
2224/37471	Chromium [Cr] as principal constituent	2224/37576	being mutually engaged together, e.g. through inserts
2224/37472	Vanadium [V] as principal constituent	2224/37578	being disposed next to each other, e.g. side-to-side arrangements
2224/37473	Rhodium [Rh] as principal constituent	2224/37599	Material
2224/37476	Ruthenium [Ru] as principal constituent	2224/376	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/37478	Iridium [Ir] as principal constituent		
2224/37479	Niobium [Nb] as principal constituent		
2224/3748	Molybdenum [Mo] as principal constituent		
2224/37481	Tantalum [Ta] as principal constituent		

2224/37601	the principal constituent melting at a temperature of less than 400°C	2224/37681	Tantalum [Ta] as principal constituent
2224/37605	Gallium [Ga] as principal constituent	2224/37683	Rhenium [Re] as principal constituent
2224/37609	Indium [In] as principal constituent	2224/37684	Tungsten [W] as principal constituent
2224/37611	Tin [Sn] as principal constituent	2224/37686	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/37613	Bismuth [Bi] as principal constituent	2224/37687	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/37688)
2224/37614	Thallium [Tl] as principal constituent	2224/37688	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/37616	Lead [Pb] as principal constituent	2224/3769	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/37617	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/37691	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/37618	Zinc [Zn] as principal constituent	2224/37693	with a principal constituent of the material being a solid not provided for in groups H01L 2224/376 - H01L 2224/37691 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/3762	Antimony [Sb] as principal constituent	2224/37694	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/376 - H01L 2224/37691
2224/37623	Magnesium [Mg] as principal constituent	2224/37695	with a principal constituent of the material being a gas not provided for in groups H01L 2224/376 - H01L 2224/37691
2224/37624	Aluminium [Al] as principal constituent	2224/37698	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/37638	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/37699	Material of the matrix
2224/37639	Silver [Ag] as principal constituent	2224/377	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/37644	Gold [Au] as principal constituent	2224/37701	the principal constituent melting at a temperature of less than 400°C
2224/37647	Copper [Cu] as principal constituent	2224/37705	Gallium [Ga] as principal constituent
2224/37649	Manganese [Mn] as principal constituent	2224/37709	Indium [In] as principal constituent
2224/37655	Nickel [Ni] as principal constituent	2224/37711	Tin [Sn] as principal constituent
2224/37657	Cobalt [Co] as principal constituent	2224/37713	Bismuth [Bi] as principal constituent
2224/3766	Iron [Fe] as principal constituent	2224/37714	Thallium [Tl] as principal constituent
2224/37663	the principal constituent melting at a temperature of greater than 1550°C	2224/37716	Lead [Pb] as principal constituent
2224/37664	Palladium [Pd] as principal constituent		
2224/37666	Titanium [Ti] as principal constituent		
2224/37669	Platinum [Pt] as principal constituent		
2224/3767	Zirconium [Zr] as principal constituent		
2224/37671	Chromium [Cr] as principal constituent		
2224/37672	Vanadium [V] as principal constituent		
2224/37673	Rhodium [Rh] as principal constituent		
2224/37676	Ruthenium [Ru] as principal constituent		
2224/37678	Iridium [Ir] as principal constituent		
2224/37679	Niobium [Nb] as principal constituent		
2224/3768	Molybdenum [Mo] as principal constituent		

2224/37717	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/37787	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/37788)
2224/37718	Zinc [Zn] as principal constituent	2224/37788	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/3772	Antimony [Sb] as principal constituent	2224/3779	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/37723	Magnesium [Mg] as principal constituent	2224/37791	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/37724	Aluminium [Al] as principal constituent	2224/37793	with a principal constituent of the material being a solid not provided for in groups H01L 2224/377 - H01L 2224/37791 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/37738	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/37794	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/377 - H01L 2224/37791
2224/37739	Silver [Ag] as principal constituent	2224/37795	with a principal constituent of the material being a gas not provided for in groups H01L 2224/377 - H01L 2224/37791
2224/37744	Gold [Au] as principal constituent	2224/37798	Fillers
2224/37747	Copper [Cu] as principal constituent	2224/37799	Base material
2224/37749	Manganese [Mn] as principal constituent	2224/378	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/37755	Nickel [Ni] as principal constituent	2224/37801	the principal constituent melting at a temperature of less than 400°C
2224/37757	Cobalt [Co] as principal constituent	2224/37805	Gallium [Ga] as principal constituent
2224/3776	Iron [Fe] as principal constituent	2224/37809	Indium [In] as principal constituent
2224/37763	the principal constituent melting at a temperature of greater than 1550°C	2224/37811	Tin [Sn] as principal constituent
2224/37764	Palladium [Pd] as principal constituent	2224/37813	Bismuth [Bi] as principal constituent
2224/37766	Titanium [Ti] as principal constituent	2224/37814	Thallium [Tl] as principal constituent
2224/37769	Platinum [Pt] as principal constituent	2224/37816	Lead [Pb] as principal constituent
2224/3777	Zirconium [Zr] as principal constituent	2224/37817	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/37771	Chromium [Cr] as principal constituent	2224/37818	Zinc [Zn] as principal constituent
2224/37772	Vanadium [V] as principal constituent	2224/3782	Antimony [Sb] as principal constituent
2224/37773	Rhodium [Rh] as principal constituent	2224/37823	Magnesium [Mg] as principal constituent
2224/37776	Ruthenium [Ru] as principal constituent	2224/37824	Aluminium [Al] as principal constituent
2224/37778	Iridium [Ir] as principal constituent		
2224/37779	Niobium [Nb] as principal constituent		
2224/3778	Molybdenum [Mo] as principal constituent		
2224/37781	Tantalum [Ta] as principal constituent		
2224/37783	Rhenium [Re] as principal constituent		
2224/37784	Tungsten [W] as principal constituent		
2224/37786	with a principal constituent of the material being a non metallic, non metalloid inorganic material		

2224/37838	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/37891	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/37839	Silver [Ag] as principal constituent	2224/37893	with a principal constituent of the material being a solid not provided for in groups H01L 2224/378 - H01L 2224/37891 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/37844	Gold [Au] as principal constituent	2224/37894	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/378 - H01L 2224/37891
2224/37847	Copper [Cu] as principal constituent	2224/37895	with a principal constituent of the material being a gas not provided for in groups H01L 2224/378 - H01L 2224/37891
2224/37849	Manganese [Mn] as principal constituent	2224/37898	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/37855	Nickel [Ni] as principal constituent	2224/37899	Coating material
2224/37857	Cobalt [Co] as principal constituent	2224/379	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/3786	Iron [Fe] as principal constituent	2224/37901	the principal constituent melting at a temperature of less than 400°C
2224/37863	the principal constituent melting at a temperature of greater than 1550°C	2224/37905	Gallium [Ga] as principal constituent
2224/37864	Palladium [Pd] as principal constituent	2224/37909	Indium [In] as principal constituent
2224/37866	Titanium [Ti] as principal constituent	2224/37911	Tin [Sn] as principal constituent
2224/37869	Platinum [Pt] as principal constituent	2224/37913	Bismuth [Bi] as principal constituent
2224/3787	Zirconium [Zr] as principal constituent	2224/37914	Thallium [Tl] as principal constituent
2224/37871	Chromium [Cr] as principal constituent	2224/37916	Lead [Pb] as principal constituent
2224/37872	Vanadium [V] as principal constituent	2224/37917	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/37873	Rhodium [Rh] as principal constituent	2224/37918	Zinc [Zn] as principal constituent
2224/37876	Ruthenium [Ru] as principal constituent	2224/3792	Antimony [Sb] as principal constituent
2224/37878	Iridium [Ir] as principal constituent	2224/37923	Magnesium [Mg] as principal constituent
2224/37879	Niobium [Nb] as principal constituent	2224/37924	Aluminium [Al] as principal constituent
2224/3788	Molybdenum [Mo] as principal constituent	2224/37938	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/37881	Tantalum [Ta] as principal constituent		
2224/37883	Rhenium [Re] as principal constituent		
2224/37884	Tungsten [W] as principal constituent		
2224/37886	with a principal constituent of the material being a non metallic, non metalloid inorganic material		
2224/37887	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/37888)		
2224/37888	Glasses, e.g. amorphous oxides, nitrides or fluorides		
2224/3789	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy		

2224/37939	...	Silver [Ag] as principal constituent	2224/37993	...	with a principal constituent of the material being a solid not provided for in groups H01L 2224/379 - H01L 2224/37991 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/37944	...	Gold [Au] as principal constituent	2224/37994	...	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/379 - H01L 2224/37991
2224/37947	...	Copper [Cu] as principal constituent	2224/37995	...	with a principal constituent of the material being a gas not provided for in groups H01L 2224/379 - H01L 2224/37991
2224/37949	...	Manganese [Mn] as principal constituent	2224/37998	...	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/37955	...	Nickel [Ni] as principal constituent	2224/37999	...	Shape or distribution of the fillers
2224/37957	...	Cobalt [Co] as principal constituent	2224/38	...	of a plurality of strap connectors
2224/3796	...	Iron [Fe] as principal constituent	2224/39	...	Structure, shape, material or disposition of the strap connectors after the connecting process
2224/37963	...	the principal constituent melting at a temperature of greater than 1550°C	2224/40	...	of an individual strap connector
2224/37964	...	Palladium [Pd] as principal constituent	2224/4001	...	Structure
2224/37966	...	Titanium [Ti] as principal constituent	2224/4005	...	Shape
2224/37969	...	Platinum [Pt] as principal constituent	2224/4007	...	of bonding interfaces, e.g. interlocking features
2224/3797	...	Zirconium [Zr] as principal constituent	2224/4009	...	Loop shape
2224/37971	...	Chromium [Cr] as principal constituent	2224/40091	...	Arched
2224/37972	...	Vanadium [V] as principal constituent	2224/40095	...	Kinked
2224/37973	...	Rhodium [Rh] as principal constituent	2224/401	...	Disposition
2224/37976	...	Ruthenium [Ru] as principal constituent	2224/40101	...	Connecting bonding areas at the same height, e.g. horizontal bond
2224/37978	...	Iridium [Ir] as principal constituent	2224/40105	...	Connecting bonding areas at different heights
2224/37979	...	Niobium [Nb] as principal constituent	2224/40106	...	the connector being orthogonal to a side surface of the semiconductor or solid-state body, e.g. parallel layout
2224/3798	...	Molybdenum [Mo] as principal constituent	2224/40108	...	the connector not being orthogonal to a side surface of the semiconductor or solid-state body, e.g. fanned-out connectors, radial layout
2224/37981	...	Tantalum [Ta] as principal constituent	2224/40111	...	the strap connector extending above another semiconductor or solid-state body
2224/37983	...	Rhenium [Re] as principal constituent	2224/4013	...	Connecting within a semiconductor or solid-state body, i.e. fly strap, bridge strap
2224/37984	...	Tungsten [W] as principal constituent	2224/40132	...	with an intermediate bond, e.g. continuous strap daisy chain
2224/37986	...	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/40135	...	Connecting between different semiconductor or solid-state bodies, i.e. chip-to-chip
2224/37987	...	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/37988)	2224/40137	...	the bodies being arranged next to each other, e.g. on a common substrate
2224/37988	...	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/40139	...	with an intermediate bond, e.g. continuous strap daisy chain
2224/3799	...	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/40141	...	the bodies being arranged on opposite sides of a substrate, e.g. mirror arrangements
2224/37991	...	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene			

2224/40145	. . . . .	the bodies being stacked	2224/40248	. . . . .	the bond pad being disposed in a recess of the surface of the item
2224/40147	. . . . .	with an intermediate bond, e.g. continuous strap daisy chain	2224/40249	. . . . .	the bond pad protruding from the surface of the item
2224/40151	. . . . .	Connecting between a semiconductor or solid-state body and an item not being a semiconductor or solid-state body, e.g. chip-to-substrate, chip-to-passive	2224/40253	. . . . .	Connecting the strap to a potential ring of the item
2224/40153	. . . . .	the body and the item being arranged next to each other, e.g. on a common substrate	2224/40257	. . . . .	Connecting the strap to a die pad of the item
2224/40155	. . . . .	the item being non-metallic, e.g. insulating substrate with or without metallisation	2224/4026	. . . . .	Connecting between the body and an opposite side of the item with respect to the body
2224/40157	. . . . .	Connecting the strap to a bond pad of the item	2224/40265	. . . . .	the item being a discrete passive component
2224/40158	. . . . .	the bond pad being disposed in a recess of the surface of the item	2224/404	. . . . .	Connecting portions
2224/40159	. . . . .	the bond pad protruding from the surface of the item	2224/4046	. . . . .	with multiple bonds on the same bonding area
2224/4016	. . . . .	Connecting the strap to a pin of the item	2224/40475	. . . . .	connected to auxiliary connecting means on the bonding areas
2224/40163	. . . . .	Connecting the strap to a potential ring of the item	2224/40477	. . . . .	being a pre-ball (i.e. a ball formed by capillary bonding)
2224/40165	. . . . .	Connecting the strap to a via metallisation of the item	2224/40479	. . . . .	on the semiconductor or solid-state body
2224/40175	. . . . .	the item being metallic	2224/4048	. . . . .	outside the semiconductor or solid-state body
2224/40177	. . . . .	Connecting the strap to a bond pad of the item	2224/40484	. . . . .	being a plurality of pre-balls disposed side-to-side
2224/40178	. . . . .	the bond pad being disposed in a recess of the surface of the item	2224/40486	. . . . .	on the semiconductor or solid-state body
2224/40179	. . . . .	the bond pad protruding from the surface of the item	2224/40487	. . . . .	outside the semiconductor or solid-state body
2224/40183	. . . . .	Connecting the strap to a potential ring of the item	2224/40491	. . . . .	being an additional member attached to the bonding area through an adhesive or solder, e.g. buffer pad
2224/40195	. . . . .	the item being a discrete passive component	2224/40496	. . . . .	not being interposed between the connector and the bonding area
2224/40221	. . . . .	the body and the item being stacked	2224/40499	. . . . .	Material of the auxiliary connecting means
2224/40225	. . . . .	the item being non-metallic, e.g. insulating substrate with or without metallisation	2224/405	. . . . .	Material
2224/40227	. . . . .	Connecting the strap to a bond pad of the item	2224/40505	. . . . .	at the bonding interface
2224/40228	. . . . .	the bond pad being disposed in a recess of the surface of the item	2224/40506	. . . . .	comprising an eutectic alloy
2224/40229	. . . . .	the bond pad protruding from the surface of the item	2224/40507	. . . . .	comprising an intermetallic compound
2224/4023	. . . . .	Connecting the strap to a pin of the item	2224/4051	. . . . .	Morphology of the connecting portion, e.g. grain size distribution
2224/40233	. . . . .	Connecting the strap to a potential ring of the item	2224/4052	. . . . .	Bonding interface between the connecting portion and the bonding area
2224/40235	. . . . .	Connecting the strap to a via metallisation of the item	2224/4099	. . . . .	Auxiliary members for strap connectors, e.g. flow-barriers, spacers
2224/40237	. . . . .	Connecting the strap to a die pad of the item	2224/40991	. . . . .	being formed on the semiconductor or solid-state body to be connected
2224/4024	. . . . .	Connecting between the body and an opposite side of the item with respect to the body	2224/40992	. . . . .	Reinforcing structures
2224/40245	. . . . .	the item being metallic	2224/40993	. . . . .	Alignment aids
2224/40247	. . . . .	Connecting the strap to a bond pad of the item	2224/40996	. . . . .	being formed on an item to be connected not being a semiconductor or solid-state body
			2224/40997	. . . . .	Reinforcing structures
			2224/40998	. . . . .	Alignment aids
			2224/41	. . . . .	of a plurality of strap connectors
			2224/4101	. . . . .	Structure
			2224/4103	. . . . .	Connectors having different sizes
			2224/4105	. . . . .	Shape
			2224/41051	. . . . .	Connectors having different shapes

2224/41052	. . . . .	Different loop heights	2224/437	. . . .	Involving monitoring, e.g. feedback loop
2224/411	. . . . .	Disposition	2224/438	. . . .	Post-treatment of the connector
2224/41105	. . . . .	Connecting at different heights	2224/4381	. . . . .	Cleaning, e.g. oxide removal step, desmearing
2224/41107	. . . . .	on the semiconductor or solid-state body being	2224/4382	. . . . .	Applying permanent coating, e.g. in-situ coating
2224/41109	. . . . .	outside the semiconductor or solid-state body	2224/43821	. . . . .	Spray coating
2224/4111	. . . . .	the connectors being bonded to at least one common bonding area, e.g. daisy chain	2224/43822	. . . . .	Dip coating
2224/41111	. . . . .	the connectors connecting two common bonding areas	2224/43823	. . . . .	Immersion coating, e.g. solder bath
2224/41112	. . . . .	the connectors connecting a common bonding area on the semiconductor or solid-state body to different bonding areas outside the body, e.g. diverging straps	2224/43824	. . . . .	Chemical solution deposition [CSD], i.e. using a liquid precursor
2224/41113	. . . . .	the connectors connecting different bonding areas on the semiconductor or solid-state body to a common bonding area outside the body, e.g. converging straps	2224/43825	. . . . .	Plating, e.g. electroplating, electroless plating
2224/4112	. . . . .	Layout	2224/43826	. . . . .	Physical vapour deposition [PVD], e.g. evaporation, sputtering
2224/4117	. . . . .	Crossed straps	2224/43827	. . . . .	Chemical vapour deposition [CVD], e.g. laser CVD
2224/41171	. . . . .	Fan-out arrangements	2224/4383	. . . . .	Reworking
2224/41173	. . . . .	Radial fan-out arrangements	2224/43831	. . . . .	with a chemical process, e.g. with etching of the connector
2224/41174	. . . . .	Stacked arrangements	2224/43847	. . . . .	with a mechanical process, e.g. with flattening of the connector
2224/41175	. . . . .	Parallel arrangements	2224/43848	. . . . .	Thermal treatments, e.g. annealing, controlled cooling
2224/41176	. . . . .	Strap connectors having the same loop shape and height	2224/43985	. . . .	Methods of manufacturing wire connectors involving a specific sequence of method steps
2224/41177	. . . . .	Combinations of different arrangements	2224/43986	. . . . .	with repetition of the same manufacturing step
2224/41179	. . . . .	Corner adaptations, i.e. disposition of the strap connectors at the corners of the semiconductor or solid-state body	2224/44	. . .	Structure, shape, material or disposition of the wire connectors prior to the connecting process
2224/4118	. . . . .	being disposed on at least two different sides of the body, e.g. dual array	2224/45	. . . .	of an individual wire connector
2224/414	. . . . .	Connecting portions	2224/45001	. . . . .	Core members of the connector
2224/4141	. . . . .	the connecting portions being stacked	2224/45005	. . . . .	Structure
2224/41421	. . . . .	on the semiconductor or solid-state body	2224/4501	. . . . .	Shape
2224/41422	. . . . .	outside the semiconductor or solid-state body	2224/45012	. . . . .	Cross-sectional shape
2224/4143	. . . . .	the connecting portions being staggered	2224/45013	. . . . .	being non uniform along the connector
2224/415	. . . . .	Material	2224/45014	. . . . .	Ribbon connectors, e.g. rectangular cross-section
2224/41505	. . . . .	Connectors having different materials	2224/45015	. . . . .	being circular
2224/42	. .	Wire connectors; Manufacturing methods related thereto	2224/45016	. . . . .	being elliptic
2224/43	. . .	Manufacturing methods	2224/4502	. . . . .	Disposition
2224/43001	. . . .	Involving a temporary auxiliary member not forming part of the manufacturing apparatus, e.g. removable or sacrificial coating, film or substrate	2224/45025	. . . . .	Plural core members
2224/431	. . . .	Pre-treatment of the preform connector	2224/45026	. . . . .	being mutually engaged together, e.g. through inserts
2224/4312	. . . . .	Applying permanent coating, e.g. in-situ coating	2224/45028	. . . . .	Side-to-side arrangements
2224/43125	. . . . .	Plating, e.g. electroplating, electroless plating	2224/4503	. . . . .	Stacked arrangements
2224/432	. . . .	Mechanical processes	2224/45032	. . . . .	Two-layer arrangements
2224/4321	. . . . .	Pulling	2224/45033	. . . . .	Three-layer arrangements
2224/435	. . . .	Modification of a pre-existing material	2224/45034	. . . . .	Four-layer arrangements
2224/4351	. . . . .	Sintering	2224/45099	. . . . .	Material
2224/4352	. . . . .	Anodisation	2224/451	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
			2224/45101	. . . . .	the principal constituent melting at a temperature of less than 400°C
			2224/45105	. . . . .	Gallium (Ga) as principal constituent

2224/45109	Indium (In) as principal constituent	2224/45184	Tungsten (W) as principal constituent
2224/45111	Tin (Sn) as principal constituent	2224/45186	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/45113	Bismuth (Bi) as principal constituent	2224/45187	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/45188)
2224/45114	Thallium (Tl) as principal constituent	2224/45188	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/45116	Lead (Pb) as principal constituent	2224/4519	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/45117	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/45191	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/45118	Zinc (Zn) as principal constituent	2224/45193	with a principal constituent of the material being a solid not provided for in groups H01L 2224/451 - H01L 2224/45191 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/4512	Antimony (Sb) as principal constituent	2224/45194	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/451 - H01L 2224/45191
2224/45123	Magnesium (Mg) as principal constituent	2224/45195	with a principal constituent of the material being a gas not provided for in groups H01L 2224/451 - H01L 2224/45191
2224/45124	Aluminium (Al) as principal constituent	2224/45198	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/45138	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/45199	Material of the matrix
2224/45139	Silver (Ag) as principal constituent	2224/452	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
2224/45144	Gold (Au) as principal constituent	2224/45201	the principal constituent melting at a temperature of less than 400°C
2224/45147	Copper (Cu) as principal constituent	2224/45205	Gallium (Ga) as principal constituent
2224/45149	Manganese (Mn) as principal constituent	2224/45209	Indium (In) as principal constituent
2224/45155	Nickel (Ni) as principal constituent	2224/45211	Tin (Sn) as principal constituent
2224/45157	Cobalt (Co) as principal constituent	2224/45213	Bismuth (Bi) as principal constituent
2224/4516	Iron (Fe) as principal constituent	2224/45214	Thallium (Tl) as principal constituent
2224/45163	the principal constituent melting at a temperature of greater than 1550°C	2224/45216	Lead (Pb) as principal constituent
2224/45164	Palladium (Pd) as principal constituent	2224/45217	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/45166	Titanium (Ti) as principal constituent		
2224/45169	Platinum (Pt) as principal constituent		
2224/4517	Zirconium (Zr) as principal constituent		
2224/45171	Chromium (Cr) as principal constituent		
2224/45172	Vanadium (V) as principal constituent		
2224/45173	Rhodium (Rh) as principal constituent		
2224/45176	Ruthenium (Ru) as principal constituent		
2224/45178	Iridium (Ir) as principal constituent		
2224/45179	Niobium (Nb) as principal constituent		
2224/4518	Molybdenum (Mo) as principal constituent		
2224/45181	Tantalum (Ta) as principal constituent		
2224/45183	Rhenium (Re) as principal constituent		

2224/45218	. . . . .	Zinc (Zn) as principal constituent	2224/45288	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/4522	. . . . .	Antimony (Sb) as principal constituent	2224/4529	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/45223	. . . . .	Magnesium (Mg) as principal constituent	2224/45291	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/45224	. . . . .	Aluminium (Al) as principal constituent	2224/45293	. . . . .	with a principal constituent of the material being a solid not provided for in groups H01L 2224/452 - H01L 2224/45291 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/45238	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/45294	. . . . .	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/452 - H01L 2224/45291
2224/45239	. . . . .	Silver (Ag) as principal constituent	2224/45295	. . . . .	with a principal constituent of the material being a gas not provided for in groups H01L 2224/452 - H01L 2224/45291
2224/45244	. . . . .	Gold (Au) as principal constituent	2224/45298	. . . . .	Fillers
2224/45247	. . . . .	Copper (Cu) as principal constituent	2224/45299	. . . . .	Base material
2224/45249	. . . . .	Manganese (Mn) as principal constituent	2224/453	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
2224/45255	. . . . .	Nickel (Ni) as principal constituent	2224/45301	. . . . .	the principal constituent melting at a temperature of less than 400°C
2224/45257	. . . . .	Cobalt (Co) as principal constituent	2224/45305	. . . . .	Gallium (Ga) as principal constituent
2224/4526	. . . . .	Iron (Fe) as principal constituent	2224/45309	. . . . .	Indium (In) as principal constituent
2224/45263	. . . . .	the principal constituent melting at a temperature of greater than 1550°C	2224/45311	. . . . .	Tin (Sn) as principal constituent
2224/45264	. . . . .	Palladium (Pd) as principal constituent	2224/45313	. . . . .	Bismuth (Bi) as principal constituent
2224/45266	. . . . .	Titanium (Ti) as principal constituent	2224/45314	. . . . .	Thallium (Tl) as principal constituent
2224/45269	. . . . .	Platinum (Pt) as principal constituent	2224/45316	. . . . .	Lead (Pb) as principal constituent
2224/4527	. . . . .	Zirconium (Zr) as principal constituent	2224/45317	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/45271	. . . . .	Chromium (Cr) as principal constituent	2224/45318	. . . . .	Zinc (Zn) as principal constituent
2224/45272	. . . . .	Vanadium (V) as principal constituent	2224/4532	. . . . .	Antimony (Sb) as principal constituent
2224/45273	. . . . .	Rhodium (Rh) as principal constituent	2224/45323	. . . . .	Magnesium (Mg) as principal constituent
2224/45276	. . . . .	Ruthenium (Ru) as principal constituent	2224/45324	. . . . .	Aluminium (Al) as principal constituent
2224/45278	. . . . .	Iridium (Ir) as principal constituent	2224/45338	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/45279	. . . . .	Niobium (Nb) as principal constituent			
2224/4528	. . . . .	Molybdenum (Mo) as principal constituent			
2224/45281	. . . . .	Tantalum (Ta) as principal constituent			
2224/45283	. . . . .	Rhenium (Re) as principal constituent			
2224/45284	. . . . .	Tungsten (W) as principal constituent			
2224/45286	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material			
2224/45287	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/45288)			

2224/45339	Silver (Ag) as principal constituent	2224/45393	with a principal constituent of the material being a solid not provided for in groups H01L 2224/453 - H01L 2224/45391 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/45344	Gold (Au) as principal constituent	2224/45394	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/453 - H01L 2224/45391
2224/45347	Copper (Cu) as principal constituent	2224/45395	with a principal constituent of the material being a gas not provided for in groups H01L 2224/453 - H01L 2224/45391
2224/45349	Manganese (Mn) as principal constituent	2224/45398	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/45355	Nickel (Ni) as principal constituent	2224/45399	Coating material
2224/45357	Cobalt (Co) as principal constituent	2224/454	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
2224/4536	Iron (Fe) as principal constituent	2224/45401	the principal constituent melting at a temperature of less than 400°C
2224/45363	the principal constituent melting at a temperature of greater than 1550°C	2224/45405	Gallium (Ga) as principal constituent
2224/45364	Palladium (Pd) as principal constituent	2224/45409	Indium (In) as principal constituent
2224/45366	Titanium (Ti) as principal constituent	2224/45411	Tin (Sn) as principal constituent
2224/45369	Platinum (Pt) as principal constituent	2224/45413	Bismuth (Bi) as principal constituent
2224/4537	Zirconium (Zr) as principal constituent	2224/45414	Thallium (Tl) as principal constituent
2224/45371	Chromium (Cr) as principal constituent	2224/45416	Lead (Pb) as principal constituent
2224/45372	Vanadium (V) as principal constituent	2224/45417	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/45373	Rhodium (Rh) as principal constituent	2224/45418	Zinc (Zn) as principal constituent
2224/45376	Ruthenium (Ru) as principal constituent	2224/4542	Antimony (Sb) as principal constituent
2224/45378	Iridium (Ir) as principal constituent	2224/45423	Magnesium (Mg) as principal constituent
2224/45379	Niobium (Nb) as principal constituent	2224/45424	Aluminium (Al) as principal constituent
2224/4538	Molybdenum (Mo) as principal constituent	2224/45438	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/45381	Tantalum (Ta) as principal constituent	2224/45439	Silver (Ag) as principal constituent
2224/45383	Rhenium (Re) as principal constituent	2224/45444	Gold (Au) as principal constituent
2224/45384	Tungsten (W) as principal constituent		
2224/45386	with a principal constituent of the material being a non metallic, non metalloid inorganic material		
2224/45387	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/45388)		
2224/45388	Glasses, e.g. amorphous oxides, nitrides or fluorides		
2224/4539	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy		
2224/45391	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene		

2224/45447	Copper (Cu) as principal constituent	2224/45494	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/454 - H01L 2224/45491
2224/45449	Manganese (Mn) as principal constituent	2224/45495	with a principal constituent of the material being a gas not provided for in groups H01L 2224/454 - H01L 2224/45491
2224/45455	Nickel (Ni) as principal constituent	2224/45498	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/45457	Cobalt (Co) as principal constituent	2224/45499	Shape or distribution of the fillers
2224/4546	Iron (Fe) as principal constituent	2224/4554	Coating
2224/45463	the principal constituent melting at a temperature of greater than 1550°C	2224/45541	Structure
2224/45464	Palladium (Pd) as principal constituent	2224/4555	Shape
2224/45466	Titanium (Ti) as principal constituent	2224/4556	Disposition, e.g. coating on a part of the core
2224/45469	Platinum (Pt) as principal constituent	2224/45565	Single coating layer
2224/4547	Zirconium (Zr) as principal constituent	2224/4557	Plural coating layers
2224/45471	Chromium (Cr) as principal constituent	2224/45572	Two-layer stack coating
2224/45472	Vanadium (V) as principal constituent	2224/45573	Three-layer stack coating
2224/45473	Rhodium (Rh) as principal constituent	2224/45574	Four-layer stack coating
2224/45476	Ruthenium (Ru) as principal constituent	2224/45576	being mutually engaged together, e.g. through inserts
2224/45478	Iridium (Ir) as principal constituent	2224/45578	being disposed next to each other, e.g. side-to-side arrangements
2224/45479	Niobium (Nb) as principal constituent	2224/45599	Material
2224/4548	Molybdenum (Mo) as principal constituent	2224/456	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
2224/45481	Tantalum (Ta) as principal constituent	2224/45601	the principal constituent melting at a temperature of less than 400°C
2224/45483	Rhenium (Re) as principal constituent	2224/45605	Gallium (Ga) as principal constituent
2224/45484	Tungsten (W) as principal constituent	2224/45609	Indium (In) as principal constituent
2224/45486	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/45611	Tin (Sn) as principal constituent
2224/45487	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/45488)	2224/45613	Bismuth (Bi) as principal constituent
2224/45488	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/45614	Thallium (Tl) as principal constituent
2224/4549	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/45616	Lead (Pb) as principal constituent
2224/45491	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/45617	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/45493	with a principal constituent of the material being a solid not provided for in groups H01L 2224/454 - H01L 2224/45491 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/45618	Zinc (Zn) as principal constituent
		2224/4562	Antimony (Sb) as principal constituent
		2224/45623	Magnesium (Mg) as principal constituent
		2224/45624	Aluminium (Al) as principal constituent
		2224/45638	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C

2224/45639	...	Silver (Ag) as principal constituent	2224/45693	...	with a principal constituent of the material being a solid not provided for in groups H01L 2224/456 - H01L 2224/45691 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/45644	...	Gold (Au) as principal constituent	2224/45694	...	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/456 - H01L 2224/45691
2224/45647	...	Copper (Cu) as principal constituent	2224/45695	...	with a principal constituent of the material being a gas not provided for in groups H01L 2224/456 - H01L 2224/45691
2224/45649	...	Manganese (Mn) as principal constituent	2224/45698	...	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/45655	...	Nickel (Ni) as principal constituent	2224/45699	...	Material of the matrix
2224/45657	...	Cobalt (Co) as principal constituent	2224/457	...	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
2224/4566	...	Iron (Fe) as principal constituent	2224/45701	...	the principal constituent melting at a temperature of less than 400°C
2224/45663	...	the principal constituent melting at a temperature of greater than 1550°C	2224/45705	...	Gallium (Ga) as principal constituent
2224/45664	...	Palladium (Pd) as principal constituent	2224/45709	...	Indium (In) as principal constituent
2224/45666	...	Titanium (Ti) as principal constituent	2224/45711	...	Tin (Sn) as principal constituent
2224/45669	...	Platinum (Pt) as principal constituent	2224/45713	...	Bismuth (Bi) as principal constituent
2224/4567	...	Zirconium (Zr) as principal constituent	2224/45714	...	Thallium (Tl) as principal constituent
2224/45671	...	Chromium (Cr) as principal constituent	2224/45716	...	Lead (Pb) as principal constituent
2224/45672	...	Vanadium (V) as principal constituent	2224/45717	...	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/45673	...	Rhodium (Rh) as principal constituent	2224/45718	...	Zinc (Zn) as principal constituent
2224/45676	...	Ruthenium (Ru) as principal constituent	2224/4572	...	Antimony (Sb) as principal constituent
2224/45678	...	Iridium (Ir) as principal constituent	2224/45723	...	Magnesium (Mg) as principal constituent
2224/45679	...	Niobium (Nb) as principal constituent	2224/45724	...	Aluminium (Al) as principal constituent
2224/4568	...	Molybdenum (Mo) as principal constituent	2224/45738	...	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/45681	...	Tantalum (Ta) as principal constituent	2224/45739	...	Silver (Ag) as principal constituent
2224/45683	...	Rhenium (Re) as principal constituent	2224/45744	...	Gold (Au) as principal constituent
2224/45684	...	Tungsten (W) as principal constituent	2224/45747	...	Copper (Cu) as principal constituent
2224/45686	...	with a principal constituent of the material being a non metallic, non metalloid inorganic material			
2224/45687	...	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/45688)			
2224/45688	...	Glasses, e.g. amorphous oxides, nitrides or fluorides			
2224/4569	...	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy			
2224/45691	...	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene			

2224/45749	Manganese (Mn) as principal constituent	2224/45794	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/457 - H01L 2224/45791
2224/45755	Nickel (Ni) as principal constituent	2224/45795	with a principal constituent of the material being a gas not provided for in groups H01L 2224/457 - H01L 2224/45791
2224/45757	Cobalt (Co) as principal constituent	2224/45798	Fillers
2224/4576	Iron (Fe) as principal constituent	2224/45799	Base material
2224/45763	the principal constituent melting at a temperature of greater than 1550°C	2224/458	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
2224/45764	Palladium (Pd) as principal constituent	2224/45801	the principal constituent melting at a temperature of less than 400°C
2224/45766	Titanium (Ti) as principal constituent	2224/45805	Gallium (Ga) as principal constituent
2224/45769	Platinum (Pt) as principal constituent	2224/45809	Indium (In) as principal constituent
2224/4577	Zirconium (Zr) as principal constituent	2224/45811	Tin (Sn) as principal constituent
2224/45771	Chromium (Cr) as principal constituent	2224/45813	Bismuth (Bi) as principal constituent
2224/45772	Vanadium (V) as principal constituent	2224/45814	Thallium (Tl) as principal constituent
2224/45773	Rhodium (Rh) as principal constituent	2224/45816	Lead (Pb) as principal constituent
2224/45776	Ruthenium (Ru) as principal constituent	2224/45817	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/45778	Iridium (Ir) as principal constituent	2224/45818	Zinc (Zn) as principal constituent
2224/45779	Niobium (Nb) as principal constituent	2224/4582	Antimony (Sb) as principal constituent
2224/4578	Molybdenum (Mo) as principal constituent	2224/45823	Magnesium (Mg) as principal constituent
2224/45781	Tantalum (Ta) as principal constituent	2224/45824	Aluminium (Al) as principal constituent
2224/45783	Rhenium (Re) as principal constituent	2224/45838	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/45784	Tungsten (W) as principal constituent	2224/45839	Silver (Ag) as principal constituent
2224/45786	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/45844	Gold (Au) as principal constituent
2224/45787	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/45788)	2224/45847	Copper (Cu) as principal constituent
2224/45788	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/45849	Manganese (Mn) as principal constituent
2224/4579	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/45855	Nickel (Ni) as principal constituent
2224/45791	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/45857	Cobalt (Co) as principal constituent
2224/45793	with a principal constituent of the material being a solid not provided for in groups H01L 2224/457 - H01L 2224/45791 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/4586	Iron (Fe) as principal constituent
		2224/45863	the principal constituent melting at a temperature of greater than 1550°C

2224/45864	Palladium (Pd) as principal constituent	2224/45898	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/45866	Titanium (Ti) as principal constituent	2224/45899	Coating material
2224/45869	Platinum (Pt) as principal constituent	2224/459	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
2224/4587	Zirconium (Zr) as principal constituent	2224/45901	the principal constituent melting at a temperature of less than 400°C
2224/45871	Chromium (Cr) as principal constituent	2224/45905	Gallium (Ga) as principal constituent
2224/45872	Vanadium (V) as principal constituent	2224/45909	Indium (In) as principal constituent
2224/45873	Rhodium (Rh) as principal constituent	2224/45911	Tin (Sn) as principal constituent
2224/45876	Ruthenium (Ru) as principal constituent	2224/45913	Bismuth (Bi) as principal constituent
2224/45878	Iridium (Ir) as principal constituent	2224/45914	Thallium (Tl) as principal constituent
2224/45879	Niobium (Nb) as principal constituent	2224/45916	Lead (Pb) as principal constituent
2224/4588	Molybdenum (Mo) as principal constituent	2224/45917	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/45881	Tantalum (Ta) as principal constituent	2224/45918	Zinc (Zn) as principal constituent
2224/45883	Rhenium (Re) as principal constituent	2224/4592	Antimony (Sb) as principal constituent
2224/45884	Tungsten (W) as principal constituent	2224/45923	Magnesium (Mg) as principal constituent
2224/45886	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/45924	Aluminium (Al) as principal constituent
2224/45887	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/45888)	2224/45938	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/45888	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/45939	Silver (Ag) as principal constituent
2224/4589	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/45944	Gold (Au) as principal constituent
2224/45891	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/45947	Copper (Cu) as principal constituent
2224/45893	with a principal constituent of the material being a solid not provided for in groups H01L 2224/458 - H01L 2224/45891 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/45949	Manganese (Mn) as principal constituent
2224/45894	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/458 - H01L 2224/45891	2224/45955	Nickel (Ni) as principal constituent
2224/45895	with a principal constituent of the material being a gas not provided for in groups H01L 2224/458 - H01L 2224/45891	2224/45957	Cobalt (Co) as principal constituent
		2224/4596	Iron (Fe) as principal constituent
		2224/45963	the principal constituent melting at a temperature of greater than 1550°C
		2224/45964	Palladium (Pd) as principal constituent

2224/45966	...	Titanium (Ti) as principal constituent	2224/45999	...	Shape or distribution of the fillers
2224/45969	...	Platinum (Pt) as principal constituent	2224/46	...	of a plurality of wire connectors
2224/4597	...	Zirconium (Zr) as principal constituent	2224/47	...	Structure, shape, material or disposition of the wire connectors after the connecting process
2224/45971	...	Chromium (Cr) as principal constituent	2224/48	...	of an individual wire connector
2224/45972	...	Vanadium (V) as principal constituent	2224/4801	...	Structure
2224/45973	...	Rhodium (Rh) as principal constituent	2224/48011	...	Length
2224/45976	...	Ruthenium (Ru) as principal constituent	2224/4805	...	Shape
2224/45978	...	Iridium (Ir) as principal constituent	2224/4807	...	of bonding interfaces, e.g. interlocking features
2224/45979	...	Niobium (Nb) as principal constituent	2224/4809	...	Loop shape
2224/4598	...	Molybdenum (Mo) as principal constituent	2224/48091	...	Arched
2224/45981	...	Tantalum (Ta) as principal constituent	2224/48092	...	Helix
2224/45983	...	Rhenium (Re) as principal constituent	2224/48095	...	Kinked
2224/45984	...	Tungsten (W) as principal constituent	2224/48096	...	the kinked part being in proximity to the bonding area on the semiconductor or solid-state body
2224/45986	...	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/48097	...	the kinked part being in proximity to the bonding area outside the semiconductor or solid-state body
2224/45987	...	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/45988)	2224/481	...	Disposition
2224/45988	...	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/48101	...	Connecting bonding areas at the same height, e.g. horizontal bond
2224/4599	...	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/48105	...	Connecting bonding areas at different heights
2224/45991	...	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/48106	...	the connector being orthogonal to a side surface of the semiconductor or solid-state body, e.g. parallel layout
2224/45993	...	with a principal constituent of the material being a solid not provided for in groups H01L 2224/459 - H01L 2224/45991 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/48108	...	the connector not being orthogonal to a side surface of the semiconductor or solid-state body, e.g. fanned-out connectors, radial layout
2224/45994	...	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/459 - H01L 2224/45991	2224/4811	...	Connecting to a bonding area of the semiconductor or solid-state body located at the far end of the body with respect to the bonding area outside the semiconductor or solid-state body
2224/45995	...	with a principal constituent of the material being a gas not provided for in groups H01L 2224/459 - H01L 2224/45991	2224/48111	...	the wire connector extending above another semiconductor or solid-state body
2224/45998	...	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/4813	...	Connecting within a semiconductor or solid-state body, i.e. fly wire, bridge wire
			2224/48132	...	with an intermediate bond, e.g. continuous wire daisy chain
			2224/48135	...	Connecting between different semiconductor or solid-state bodies, i.e. chip-to-chip
			2224/48137	...	the bodies being arranged next to each other, e.g. on a common substrate
			2224/48138	...	the wire connector connecting to a bonding area disposed in a recess of the surface
			2224/48139	...	with an intermediate bond, e.g. continuous wire daisy chain
			2224/4814	...	the wire connector connecting to a bonding area protruding from the surface
			2224/48141	...	the bodies being arranged on opposite sides of a substrate, e.g. mirror arrangements
			2224/48145	...	the bodies being stacked
			2224/48147	...	with an intermediate bond, e.g. continuous wire daisy chain

2224/48148	the wire connector connecting to a bonding area disposed in a recess of the surface	2224/48247	connecting the wire to a bond pad of the item
2224/48149	the wire connector connecting to a bonding area protruding from the surface	2224/48248	the bond pad being disposed in a recess of the surface of the item
2224/48151	Connecting between a semiconductor or solid-state body and an item not being a semiconductor or solid-state body, e.g. chip-to-substrate, chip-to-passive	2224/48249	the bond pad protruding from the surface of the item
2224/48153	the body and the item being arranged next to each other, e.g. on a common substrate	2224/48253	connecting the wire to a potential ring of the item
2224/48155	the item being non-metallic, e.g. insulating substrate with or without metallisation	2224/48257	connecting the wire to a die pad of the item
2224/48157	connecting the wire to a bond pad of the item	2224/4826	Connecting between the body and an opposite side of the item with respect to the body
2224/48158	the bond pad being disposed in a recess of the surface of the item	2224/48265	the item being a discrete passive component
2224/48159	the bond pad protruding from the surface of the item	2224/484	Connecting portions
2224/4816	connecting the wire to a pin of the item	2224/4845	Details of ball bonds
2224/48163	connecting the wire to a potential ring of the item	2224/48451	Shape
2224/48165	connecting the wire to a via metallisation of the item	2224/48453	of the interface with the bonding area
2224/48175	the item being metallic	2224/48455	Details of wedge bonds
2224/48177	connecting the wire to a bond pad of the item	2224/48456	Shape
2224/48178	the bond pad being disposed in a recess of the surface of the item	2224/48458	of the interface with the bonding area
2224/48179	the bond pad protruding from the surface of the item	2224/4846	with multiple bonds on the same bonding area
2224/48183	connecting the wire to a potential ring of the item	2224/48463	the connecting portion on the bonding area of the semiconductor or solid-state body being a ball bond
2224/48195	the item being a discrete passive component	2224/48464	the other connecting portion not on the bonding area also being a ball bond, i.e. ball-to-ball
2224/48221	the body and the item being stacked	2224/48465	the other connecting portion not on the bonding area being a wedge bond, i.e. ball-to-wedge, regular stitch
2224/48225	the item being non-metallic, e.g. insulating substrate with or without metallisation	2224/4847	the connecting portion on the bonding area of the semiconductor or solid-state body being a wedge bond
2224/48227	connecting the wire to a bond pad of the item	2224/48471	the other connecting portion not on the bonding area being a ball bond, i.e. wedge-to-ball, reverse stitch
2224/48228	the bond pad being disposed in a recess of the surface of the item	2224/48472	the other connecting portion not on the bonding area also being a wedge bond, i.e. wedge-to-wedge
2224/48229	the bond pad protruding from the surface of the item	2224/48475	connected to auxiliary connecting means on the bonding areas, e.g. pre-ball, wedge-on-ball, ball-on-ball
2224/4823	connecting the wire to a pin of the item	2224/48476	between the wire connector and the bonding area
2224/48233	connecting the wire to a potential ring of the item	2224/48477	being a pre-ball (i.e. a ball formed by capillary bonding)
2224/48235	connecting the wire to a via metallisation of the item	2224/48478	the connecting portion being a wedge bond, i.e. wedge on pre-ball
2224/48237	connecting the wire to a die pad of the item	2224/48479	on the semiconductor or solid-state body
2224/4824	Connecting between the body and an opposite side of the item with respect to the body	2224/4848	outside the semiconductor or solid-state body
2224/48245	the item being metallic	2224/48481	the connecting portion being a ball bond, i.e. ball on pre-ball
		2224/48482	on the semiconductor or solid-state body

2224/48483	outside the semiconductor or solid-state body	2224/48618	Zinc (Zn) as principal constituent
2224/48484	being a plurality of pre-balls disposed side-to-side	2224/4862	Antimony (Sb) as principal constituent
2224/48485	the connecting portion being a wedge bond, i.e. wedge on pre-ball	2224/48623	Magnesium (Mg) as principal constituent
2224/48486	on the semiconductor or solid-state body	2224/48624	Aluminium (Al) as principal constituent
2224/48487	outside the semiconductor or solid-state body	2224/48638	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/48488	the connecting portion being a ball bond, i.e. ball on pre-ball	2224/48639	Silver (Ag) as principal constituent
2224/48489	on the semiconductor or solid-state body	2224/48644	Gold (Au) as principal constituent
2224/4849	outside the semiconductor or solid-state body	2224/48647	Copper (Cu) as principal constituent
2224/48491	being an additional member attached to the bonding area through an adhesive or solder, e.g. buffer pad	2224/48649	Manganese (Mn) as principal constituent
2224/48496	not being interposed between the wire connector and the bonding area	2224/48655	Nickel (Ni) as principal constituent
2224/48499	Material of the auxiliary connecting means	2224/48657	Cobalt (Co) as principal constituent
2224/485	Material	2224/4866	Iron (Fe) as principal constituent
2224/48505	at the bonding interface	2224/48663	the principal constituent melting at a temperature of greater than 1550°C
2224/48506	comprising an eutectic alloy	2224/48664	Palladium (Pd) as principal constituent
2224/48507	comprising an intermetallic compound	2224/48666	Titanium (Ti) as principal constituent
2224/4851	Morphology of the connecting portion, e.g. grain size distribution	2224/48669	Platinum (Pt) as principal constituent
2224/48511	Heat affected zone [HAZ]	2224/4867	Zirconium (Zr) as principal constituent
2224/4852	Bonding interface between the connecting portion and the bonding area	2224/48671	Chromium (Cr) as principal constituent
2224/48599	Principal constituent of the connecting portion of the wire connector being Gold (Au)	2224/48672	Vanadium (V) as principal constituent
2224/486	with a principal constituent of the bonding area being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof	2224/48673	Rhodium (Rh) as principal constituent
2224/48601	the principal constituent melting at a temperature of less than 400°C	2224/48678	Iridium (Ir) as principal constituent
2224/48605	Gallium (Ga) as principal constituent	2224/48679	Niobium (Nb) as principal constituent
2224/48609	Indium (In) as principal constituent	2224/4868	Molybdenum (Mo) as principal constituent
2224/48611	Tin (Sn) as principal constituent	2224/48681	Tantalum (Ta) as principal constituent
2224/48613	Bismuth (Bi) as principal constituent	2224/48683	Rhenium (Re) as principal constituent
2224/48614	Thallium (Tl) as principal constituent	2224/48684	Tungsten (W) as principal constituent
2224/48616	Lead (Pb) as principal constituent	2224/48686	with a principal constituent of the bonding area being a non metallic, non metalloid inorganic material
2224/48617	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950 °C	2224/48687	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/48688)
		2224/48688	Glasses, e.g. amorphous oxides, nitrides or fluorides

2224/4869	. . . . .	with a principal constituent of the bonding area being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/48739	. . . . .	Silver (Ag) as principal constituent
2224/48691	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/48744	. . . . .	Gold (Au) as principal constituent
2224/48693	. . . . .	with a principal constituent of the bonding area being a solid not provided for in groups H01L 2224/486 - H01L 2224/4869 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/48747	. . . . .	Copper (Cu) as principal constituent
2224/48694	. . . . .	with a principal constituent of the bonding area being a liquid not provided for in groups H01L 2224/486 - H01L 2224/4869	2224/48749	. . . . .	Manganese (Mn) as principal constituent
2224/48698	. . . . .	with a principal constituent of the bonding area being a combination of two or more material regions, i.e. being a hybrid material, e.g. segmented structures, island patterns	2224/48755	. . . . .	Nickel (Ni) as principal constituent
2224/48699	. . . . .	Principal constituent of the connecting portion of the wire connector being Aluminium (Al)	2224/48757	. . . . .	Cobalt (Co) as principal constituent
2224/487	. . . . .	with a principal constituent of the bonding area being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof	2224/4876	. . . . .	Iron (Fe) as principal constituent
2224/48701	. . . . .	the principal constituent melting at a temperature of less than 400°C	2224/48763	. . . . .	the principal constituent melting at a temperature of greater than 1550°C
2224/48705	. . . . .	Gallium (Ga) as principal constituent	2224/48764	. . . . .	Palladium (Pd) as principal constituent
2224/48709	. . . . .	Indium (In) as principal constituent	2224/48766	. . . . .	Titanium (Ti) as principal constituent
2224/48711	. . . . .	Tin (Sn) as principal constituent	2224/48769	. . . . .	Platinum (Pt) as principal constituent
2224/48713	. . . . .	Bismuth (Bi) as principal constituent	2224/4877	. . . . .	Zirconium (Zr) as principal constituent
2224/48714	. . . . .	Thallium (Tl) as principal constituent	2224/48771	. . . . .	Chromium (Cr) as principal constituent
2224/48716	. . . . .	Lead (Pb) as principal constituent	2224/48772	. . . . .	Vanadium (V) as principal constituent
2224/48717	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950 °C	2224/48773	. . . . .	Rhodium (Rh) as principal constituent
2224/48718	. . . . .	Zinc (Zn) as principal constituent	2224/48778	. . . . .	Iridium (Ir) as principal constituent
2224/4872	. . . . .	Antimony (Sb) as principal constituent	2224/48779	. . . . .	Niobium (Nb) as principal constituent
2224/48723	. . . . .	Magnesium (Mg) as principal constituent	2224/4878	. . . . .	Molybdenum (Mo) as principal constituent
2224/48724	. . . . .	Aluminium (Al) as principal constituent	2224/48781	. . . . .	Tantalum (Ta) as principal constituent
2224/48738	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/48783	. . . . .	Rhenium (Re) as principal constituent
			2224/48784	. . . . .	Tungsten (W) as principal constituent
			2224/48786	. . . . .	with a principal constituent of the bonding area being a non metallic, non metalloid inorganic material
			2224/48787	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/48788)
			2224/48788	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
			2224/4879	. . . . .	with a principal constituent of the bonding area being a polymer, e.g. polyester, phenolic based polymer, epoxy
			2224/48791	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene

2224/48793	with a principal constituent of the bonding area being a solid not provided for in groups H01L 2224/487 - H01L 2224/4879 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/48855	Nickel (Ni) as principal constituent
2224/48794	with a principal constituent of the bonding area being a liquid not provided for in groups H01L 2224/487 - H01L 2224/4879	2224/48857	Cobalt (Co) as principal constituent
2224/48798	with a principal constituent of the bonding area being a combination of two or more material regions, i.e. being a hybrid material, e.g. segmented structures, island patterns	2224/4886	Iron (Fe) as principal constituent
2224/48799	Principal constituent of the connecting portion of the wire connector being Copper (Cu)	2224/48863	the principal constituent melting at a temperature of greater than 1550°C
2224/488	with a principal constituent of the bonding area being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof	2224/48864	Palladium (Pd) as principal constituent
2224/48801	the principal constituent melting at a temperature of less than 400°C	2224/48866	Titanium (Ti) as principal constituent
2224/48805	Gallium (Ga) as principal constituent	2224/48869	Platinum (Pt) as principal constituent
2224/48809	Indium (In) as principal constituent	2224/4887	Zirconium (Zr) as principal constituent
2224/48811	Tin (Sn) as principal constituent	2224/48871	Chromium (Cr) as principal constituent
2224/48813	Bismuth (Bi) as principal constituent	2224/48872	Vanadium (V) as principal constituent
2224/48814	Thallium (Tl) as principal constituent	2224/48873	Rhodium (Rh) as principal constituent
2224/48816	Lead (Pb) as principal constituent	2224/48878	Iridium (Ir) as principal constituent
2224/48817	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950 °C	2224/48879	Niobium (Nb) as principal constituent
2224/48818	Zinc (Zn) as principal constituent	2224/4888	Molybdenum (Mo) as principal constituent
2224/4882	Antimony (Sb) as principal constituent	2224/48881	Tantalum (Ta) as principal constituent
2224/48823	Magnesium (Mg) as principal constituent	2224/48883	Rhenium (Re) as principal constituent
2224/48824	Aluminium (Al) as principal constituent	2224/48884	Tungsten (W) as principal constituent
2224/48838	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/48886	with a principal constituent of the bonding area being a non metallic, non metalloid inorganic material
2224/48839	Silver (Ag) as principal constituent	2224/48887	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/48888)
2224/48844	Gold (Au) as principal constituent	2224/48888	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/48847	Copper (Cu) as principal constituent	2224/4889	with a principal constituent of the bonding area being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/48849	Manganese (Mn) as principal constituent	2224/48891	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
		2224/48893	with a principal constituent of the bonding area being a solid not provided for in groups H01L 2224/488 - H01L 2224/4889 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
		2224/48894	with a principal constituent of the bonding area being a liquid not provided for in groups H01L 2224/488 - H01L 2224/4889

2224/48898	. . . . .	with a principal constituent of the bonding area being a combination of two or more material regions, i.e. being a hybrid material, e.g. segmented structures, island patterns	2224/49179	. . . . .	Corner adaptations, i.e. disposition of the wire connectors at the corners of the semiconductor or solid-state body
2224/4899	. . . . .	Auxiliary members for wire connectors, e.g. flow-barriers, reinforcing structures, spacers, alignment aids	2224/4918	. . . . .	being disposed on at least two different sides of the body, e.g. dual array
2224/48991	. . . . .	being formed on the semiconductor or solid-state body to be connected	2224/494	. . . . .	Connecting portions
2224/48992	. . . . .	Reinforcing structures	2224/4941	. . . . .	the connecting portions being stacked
2224/48993	. . . . .	Alignment aids	2224/4942	. . . . .	Ball bonds
2224/48996	. . . . .	being formed on an item to be connected not being a semiconductor or solid-state body	2224/49421	. . . . .	on the semiconductor or solid-state body
2224/48997	. . . . .	Reinforcing structures	2224/49422	. . . . .	outside the semiconductor or solid-state body
2224/48998	. . . . .	Alignment aids	2224/49425	. . . . .	Wedge bonds
2224/49	. . . . .	of a plurality of wire connectors	2224/49426	. . . . .	on the semiconductor or solid-state body
2224/4901	. . . . .	Structure	2224/49427	. . . . .	outside the semiconductor or solid-state body
2224/4903	. . . . .	Connectors having different sizes, e.g. different diameters	2224/49429	. . . . .	Wedge and ball bonds
2224/4905	. . . . .	Shape	2224/4943	. . . . .	the connecting portions being staggered
2224/49051	. . . . .	Connectors having different shapes	2224/49431	. . . . .	on the semiconductor or solid-state body
2224/49052	. . . . .	Different loop heights	2224/49433	. . . . .	outside the semiconductor or solid-state body
2224/4909	. . . . .	Loop shape arrangement	2224/4945	. . . . .	Wire connectors having connecting portions of different types on the semiconductor or solid-state body, e.g. regular and reverse stitches
2224/49095	. . . . .	parallel in plane	2224/495	. . . . .	Material
2224/49096	. . . . .	horizontal	2224/49505	. . . . .	Connectors having different materials
2224/49097	. . . . .	vertical	2224/50	. . . . .	Tape automated bonding [TAB] connectors, i.e. film carriers; Manufacturing methods related thereto
2224/491	. . . . .	Disposition	2224/63	. . . . .	Connectors not provided for in any of the groups H01L 2224/10 - H01L 2224/50 and subgroups; Manufacturing methods related thereto
2224/49105	. . . . .	Connecting at different heights	2224/64	. . . . .	Manufacturing methods
2224/49107	. . . . .	on the semiconductor or solid-state body	2224/65	. . . . .	Structure, shape, material or disposition of the connectors prior to the connecting process
2224/49109	. . . . .	outside the semiconductor or solid-state body	2224/66	. . . . .	of an individual connector
2224/4911	. . . . .	the connectors being bonded to at least one common bonding area, e.g. daisy chain	2224/67	. . . . .	of a plurality of connectors
2224/49111	. . . . .	the connectors connecting two common bonding areas, e.g. Litz or braid wires	2224/68	. . . . .	Structure, shape, material or disposition of the connectors after the connecting process
2224/49112	. . . . .	the connectors connecting a common bonding area on the semiconductor or solid-state body to different bonding areas outside the body, e.g. diverging wires	2224/69	. . . . .	of an individual connector
2224/49113	. . . . .	the connectors connecting different bonding areas on the semiconductor or solid-state body to a common bonding area outside the body, e.g. converging wires	2224/70	. . . . .	of a plurality of connectors
2224/4912	. . . . .	Layout	2224/71	. . . . .	Means for bonding not being attached to, or not being formed on, the surface to be connected
2224/4917	. . . . .	Crossed wires	2224/72	. . . . .	Detachable connecting means consisting of mechanical auxiliary parts connecting the device, e.g. pressure contacts using springs or clips
2224/49171	. . . . .	Fan-out arrangements	2224/73	. . . . .	Means for bonding being of different types provided for in two or more of groups H01L 2224/10 , H01L 2224/18 , H01L 2224/26 , H01L 2224/34 , H01L 2224/42 , H01L 2224/50 , H01L 2224/63 , H01L 2224/71
2224/49173	. . . . .	Radial fan-out arrangements	2224/731	. . . . .	Location prior to the connecting process
2224/49174	. . . . .	Stacked arrangements	2224/73101	. . . . .	on the same surface
2224/49175	. . . . .	Parallel arrangements	2224/73103	. . . . .	Bump and layer connectors
2224/49176	. . . . .	Wire connectors having the same loop shape and height	2224/73104	. . . . .	the bump connector being embedded into the layer connector
2224/49177	. . . . .	Combinations of different arrangements	2224/73151	. . . . .	on different surfaces
			2224/73153	. . . . .	Bump and layer connectors
			2224/732	. . . . .	Location after the connecting process
			2224/73201	. . . . .	on the same surface

2224/73203	. . . .	Bump and layer connectors	2224/75161	. . . .	Means for screen printing, e.g. roller, squeegee, screen stencil
2224/73204	. . . .	the bump connector being embedded into the layer connector	2224/7517	. . . .	Means for applying a preform, e.g. laminator
2224/73205	. . . .	Bump and strap connectors	2224/75171	. . . .	including a vacuum-bag
2224/73207	. . . .	Bump and wire connectors	2224/7518	. . . .	Means for blanket deposition
2224/73209	. . . .	Bump and HDI connectors	2224/75181	. . . .	for spin coating, i.e. spin coater
2224/73211	. . . .	Bump and TAB connectors	2224/75182	. . . .	for curtain coating
2224/73213	. . . .	Layer and strap connectors	2224/75183	. . . .	for immersion coating, i.e. bath
2224/73215	. . . .	Layer and wire connectors	2224/75184	. . . .	for spray coating, i.e. nozzle
2224/73217	. . . .	Layer and HDI connectors	2224/75185	. . . .	Means for physical vapour deposition [PVD], e.g. evaporation, sputtering
2224/73219	. . . .	Layer and TAB connectors	2224/75186	. . . .	Means for sputtering, e.g. target
2224/73221	. . . .	Strap and wire connectors	2224/75187	. . . .	Means for evaporation
2224/73223	. . . .	Strap and HDI connectors	2224/75188	. . . .	Means for chemical vapour deposition [CVD], e.g. for laser CVD
2224/73225	. . . .	Strap and TAB connectors	2224/75189	. . . .	Means for plating, e.g. for electroplating, electroless plating
2224/73227	. . . .	Wire and HDI connectors	2224/752	. . . .	Protection means against electrical discharge
2224/73229	. . . .	Wire and TAB connectors	2224/7525	. . . .	Means for applying energy, e.g. heating means
2224/73231	. . . .	HDI and TAB connectors	2224/75251	. . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/73251	. . . .	on different surfaces	2224/75252	. . . .	in the upper part of the bonding apparatus, e.g. in the bonding head
2224/73253	. . . .	Bump and layer connectors	2224/75253	. . . .	adapted for localised heating
2224/73255	. . . .	Bump and strap connectors	2224/7526	. . . .	Polychromatic heating lamp
2224/73257	. . . .	Bump and wire connectors	2224/75261	. . . .	Laser
2224/73259	. . . .	Bump and HDI connectors	2224/75262	. . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/73261	. . . .	Bump and TAB connectors	2224/75263	. . . .	in the upper part of the bonding apparatus, e.g. in the bonding head
2224/73263	. . . .	Layer and strap connectors	2224/75264	. . . .	by induction heating, i.e. coils
2224/73265	. . . .	Layer and wire connectors	2224/75265	. . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/73267	. . . .	Layer and HDI connectors	2224/75266	. . . .	in the upper part of the bonding apparatus, e.g. in the bonding head
2224/73269	. . . .	Layer and TAB connectors	2224/75267	. . . .	Flame torch, e.g. hydrogen torch
2224/73271	. . . .	Strap and wire connectors	2224/75268	. . . .	Discharge electrode
2224/73273	. . . .	Strap and HDI connectors	2224/75269	. . . .	Shape of the discharge electrode
2224/73275	. . . .	Strap and TAB connectors	2224/7527	. . . .	Material of the discharge electrode
2224/73277	. . . .	Wire and HDI connectors	2224/75271	. . . .	Circuitry of the discharge electrode
2224/73279	. . . .	Wire and TAB connectors	2224/75272	. . . .	Oven
2224/73281	. . . .	HDI and TAB connectors	2224/7528	. . . .	Resistance welding electrodes, i.e. for ohmic heating
2224/74	. . . .	Apparatus for manufacturing arrangements for connecting or disconnecting semiconductor or solid-state bodies and for methods related thereto	2224/75281	. . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/741	. . . .	Apparatus for manufacturing means for bonding, e.g. connectors	2224/75282	. . . .	in the upper part of the bonding apparatus, e.g. in the bonding head
2224/742	. . . .	Apparatus for manufacturing bump connectors	2224/75283	. . . .	by infrared heating, e.g. infrared heating lamp
2224/743	. . . .	Apparatus for manufacturing layer connectors	2224/753	. . . .	by means of pressure
2224/744	. . . .	Apparatus for manufacturing strap connectors	2224/75301	. . . .	Bonding head
2224/745	. . . .	Apparatus for manufacturing wire connectors	2224/75302	. . . .	Shape
2224/749	. . . .	Tools for reworking, e.g. for shaping	2224/75303	. . . .	of the pressing surface
2224/75	. . . .	Apparatus for connecting with bump connectors or layer connectors	2224/75304	. . . .	being curved
2224/75001	. . . .	Calibration means	2224/75305	. . . .	comprising protrusions
2224/7501	. . . .	Means for cleaning, e.g. brushes, for hydro blasting, for ultrasonic cleaning, for dry ice blasting, using gas-flow, by etching, by applying flux or plasma	2224/7531	. . . .	of other parts
2224/751	. . . .	Means for controlling the bonding environment, e.g. valves, vacuum pumps	2224/75312	. . . .	Material
2224/75101	. . . .	Chamber	2224/75313	. . . .	Removable bonding head
2224/75102	. . . .	Vacuum chamber	2224/75314	. . . .	Auxiliary members on the pressing surface
2224/7511	. . . .	High pressure chamber	2224/75315	. . . .	Elastomer inlay
2224/7515	. . . .	Means for applying permanent coating, e.g. in-situ coating	2224/75316	. . . .	with retaining mechanisms
2224/75151	. . . .	Means for direct writing	2224/75317	. . . .	Removable auxiliary member
2224/75152	. . . .	Syringe			
2224/75153	. . . .	integrated into the bonding head			
2224/75155	. . . .	Jetting means, e.g. ink jet			
2224/75158	. . . .	including a laser			

2224/75318	. . . . .	Shape of the auxiliary member	2224/75744	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/7532	. . . . .	Material of the auxiliary member	2224/75745	. . . . .	in the upper part of the bonding apparatus, e.g. in the bonding head
2224/75343	. . . . .	by ultrasonic vibrations	2224/75753	. . . . .	Means for optical alignment, e.g. sensors
2224/75344	. . . . .	Eccentric cams	2224/75754	. . . . .	Guiding structures
2224/75345	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/75755	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/75346	. . . . .	in the upper part of the bonding apparatus, e.g. in the bonding head	2224/75756	. . . . .	in the upper part of the bonding apparatus, e.g. in the bonding head
2224/75347	. . . . .	Piezoelectric transducers	2224/758	. . . . .	Means for moving parts
2224/75348	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/75801	. . . . .	Lower part of the bonding apparatus, e.g. XY table
2224/75349	. . . . .	in the upper part of the bonding apparatus, e.g. in the bonding head	2224/75802	. . . . .	Rotational mechanism
2224/7535	. . . . .	Stable and mobile yokes	2224/75803	. . . . .	Pivoting mechanism
2224/75351	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/75804	. . . . .	Translational mechanism
2224/75352	. . . . .	in the upper part of the bonding apparatus, e.g. in the bonding head	2224/75821	. . . . .	Upper part of the bonding apparatus, i.e. bonding head
2224/75353	. . . . .	Ultrasonic horns	2224/75822	. . . . .	Rotational mechanism
2224/75354	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/75823	. . . . .	Pivoting mechanism
2224/75355	. . . . .	Design, e.g. of the wave guide	2224/75824	. . . . .	Translational mechanism
2224/755	. . . . .	Cooling means	2224/75841	. . . . .	of the bonding head
2224/75501	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/75842	. . . . .	Rotational mechanism
2224/75502	. . . . .	in the upper part of the bonding apparatus, e.g. in the bonding head	2224/75843	. . . . .	Pivoting mechanism
2224/7555	. . . . .	Mechanical means, e.g. for planarising, pressing, stamping	2224/759	. . . . .	Means for monitoring the connection process
2224/756	. . . . .	Means for supplying the connector to be connected in the bonding apparatus	2224/75901	. . . . .	using a computer, e.g. fully- or semi-automatic bonding
2224/75601	. . . . .	Storing means	2224/7592	. . . . .	Load or pressure adjusting means, e.g. sensors
2224/75611	. . . . .	Feeding means	2224/75925	. . . . .	Vibration adjusting means, e.g. sensors
2224/75621	. . . . .	Holding means	2224/7595	. . . . .	Means for forming additional members
2224/7565	. . . . .	Means for transporting the components to be connected	2224/7598	. . . . .	specially adapted for batch processes
2224/75651	. . . . .	Belt conveyor	2224/75981	. . . . .	Apparatus chuck
2224/75652	. . . . .	Chain conveyor	2224/75982	. . . . .	Shape
2224/75653	. . . . .	Vibrating conveyor	2224/75983	. . . . .	of the mounting surface
2224/75654	. . . . .	Pneumatic conveyor	2224/75984	. . . . .	of other portions
2224/75655	. . . . .	in a fluid	2224/75985	. . . . .	Material
2224/757	. . . . .	Means for aligning	2224/75986	. . . . .	Auxiliary members on the pressing surface
2224/75701	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/75987	. . . . .	Shape of the auxiliary member
2224/75702	. . . . .	in the upper part of the bonding apparatus, e.g. in the bonding head	2224/75988	. . . . .	Material of the auxiliary member
2224/75703	. . . . .	Mechanical holding means	2224/76	. . . . .	Apparatus for connecting with build-up interconnects
2224/75704	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/76001	. . . . .	Calibration means
2224/75705	. . . . .	in the upper part of the bonding apparatus, e.g. in the bonding head	2224/7601	. . . . .	Means for cleaning, e.g. brushes, for hydro blasting, for ultrasonic cleaning, for dry ice blasting, using gas-flow, by etching, by applying flux or plasma
2224/75723	. . . . .	Electrostatic holding means	2224/761	. . . . .	Means for controlling the bonding environment, e.g. valves, vacuum pumps
2224/75724	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/76101	. . . . .	Chamber
2224/75725	. . . . .	in the upper part of the bonding apparatus, e.g. in the bonding head	2224/76102	. . . . .	Vacuum chamber
2224/75733	. . . . .	Magnetic holding means	2224/7611	. . . . .	High pressure chamber
2224/75734	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/7615	. . . . .	Means for depositing
2224/75735	. . . . .	in the upper part of the bonding apparatus, e.g. in the bonding head	2224/76151	. . . . .	Means for direct writing
2224/75743	. . . . .	Suction holding means	2224/76152	. . . . .	Syringe
			2224/76155	. . . . .	Jetting means, e.g. ink jet
			2224/76158	. . . . .	including a laser
			2224/76161	. . . . .	Means for screen printing, e.g. roller, squeegee, screen stencil
			2224/7617	. . . . .	Means for applying a preform, e.g. laminator
			2224/76171	. . . . .	including a vacuum-bag
			2224/7618	. . . . .	Means for blanket deposition

2224/76181	. . . . .	for spin coating, i.e. spin coater	2224/76347	. . . . .	Piezoelectric transducers
2224/76182	. . . . .	for curtain coating	2224/76348	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/76183	. . . . .	for immersion coating, i.e. bath	2224/76349	. . . . .	in the upper part of the bonding apparatus
2224/76184	. . . . .	for spray coating, i.e. nozzle	2224/7635	. . . . .	Stable and mobile yokes
2224/76185	. . . . .	Means for physical vapour deposition [PVD]	2224/76351	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/76186	. . . . .	Means for sputtering, e.g. target	2224/76352	. . . . .	in the upper part of the bonding apparatus
2224/76187	. . . . .	Means for evaporation	2224/76353	. . . . .	Ultrasonic horns
2224/76188	. . . . .	Means for chemical vapour deposition [CVD], e.g. for laser CVD	2224/76354	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/76189	. . . . .	Means for plating, e.g. for electroplating, electroless plating	2224/76355	. . . . .	Design, e.g. of the wave guide
2224/762	. . .	Protection means against electrical discharge	2224/765	. . .	Cooling means
2224/7625	. . .	Means for applying energy, e.g. heating means	2224/76501	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/76251	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/76502	. . . . .	in the upper part of the bonding apparatus
2224/76252	. . . . .	in the upper part of the bonding apparatus	2224/7655	. . .	Mechanical means, e.g. for planarising, pressing, stamping
2224/76253	. . . . .	adapted for localised heating	2224/76552	. . . . .	for drilling
2224/7626	. . . . .	Polychromatic heating lamp	2224/76554	. . . . .	for abrasive blasting, e.g. sand blasting, wet blasting, hydro-blasting, dry ice blasting
2224/76261	. . . . .	Laser	2224/766	. . .	Means for supplying the material of the interconnect
2224/76262	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/76601	. . . . .	Storing means
2224/76263	. . . . .	in the upper part of the bonding apparatus	2224/76611	. . . . .	Feeding means
2224/76264	. . . . .	by induction heating, i.e. coils	2224/76621	. . . . .	Holding means
2224/76265	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/7665	. . . . .	Means for transporting the components to be connected
2224/76266	. . . . .	in the upper part of the bonding apparatus	2224/76651	. . . . .	Belt conveyor
2224/76267	. . . . .	Flame torch, e.g. hydrogen torch	2224/76652	. . . . .	Chain conveyor
2224/76268	. . . . .	Discharge electrode	2224/76653	. . . . .	Vibrating conveyor
2224/76269	. . . . .	Shape of the discharge electrode	2224/76654	. . . . .	Pneumatic conveyor
2224/7627	. . . . .	Material of the discharge electrode	2224/76655	. . . . .	in a fluid
2224/76271	. . . . .	Circuitry of the discharge electrode	2224/767	. . .	Means for aligning
2224/76272	. . . . .	Oven	2224/76701	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/7628	. . . . .	Resistance welding electrodes, i.e. for ohmic heating	2224/76702	. . . . .	in the upper part of the bonding apparatus
2224/76281	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/76703	. . . . .	Mechanical holding means
2224/76282	. . . . .	in the upper part of the bonding apparatus	2224/76704	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/76283	. . . . .	by infrared heating, e.g. infrared heating lamp	2224/76705	. . . . .	in the upper part of the bonding apparatus
2224/763	. . . . .	by means of pressure	2224/76723	. . . . .	Electrostatic holding means
2224/76301	. . . . .	Pressing head	2224/76724	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/76302	. . . . .	Shape	2224/76725	. . . . .	in the upper part of the bonding apparatus
2224/76303	. . . . .	of the pressing surface	2224/76733	. . . . .	Magnetic holding means
2224/76304	. . . . .	being curved	2224/76734	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/76305	. . . . .	comprising protrusions	2224/76735	. . . . .	in the upper part of the bonding apparatus
2224/7631	. . . . .	of other parts	2224/76743	. . . . .	Suction holding means
2224/76312	. . . . .	Material	2224/76744	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/76313	. . . . .	Removable pressing head	2224/76745	. . . . .	in the upper part of the bonding apparatus
2224/76314	. . . . .	Auxiliary members on the pressing surface	2224/76753	. . . . .	Means for optical alignment, e.g. sensors
2224/76315	. . . . .	Elastomer inlay	2224/76754	. . . . .	Guiding structures
2224/76316	. . . . .	with retaining mechanisms	2224/76755	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/76317	. . . . .	Removable auxiliary member	2224/76756	. . . . .	in the upper part of the bonding apparatus
2224/76318	. . . . .	Shape of the auxiliary member	2224/768	. . .	Means for moving parts
2224/7632	. . . . .	Material of the auxiliary member	2224/76801	. . . . .	Lower part of the bonding apparatus, e.g. XY table
2224/76343	. . . . .	by ultrasonic vibrations			
2224/76344	. . . . .	Eccentric cams			
2224/76345	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck			
2224/76346	. . . . .	in the upper part of the bonding apparatus			

2224/76802	. . . . .	Rotational mechanism	2224/772	. . . . .	Protection means against electrical discharge
2224/76803	. . . . .	Pivoting mechanism	2224/7725	. . . . .	Means for applying energy, e.g. heating means
2224/76804	. . . . .	Translational mechanism	2224/77251	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/76821	. . . . .	Upper part of the bonding apparatus, i.e. bonding head	2224/77252	. . . . .	in the upper part of the bonding apparatus, e.g. in the wedge
2224/76822	. . . . .	Rotational mechanism	2224/77253	. . . . .	adapted for localised heating
2224/76823	. . . . .	Pivoting mechanism	2224/7726	. . . . .	Polychromatic heating lamp
2224/76824	. . . . .	Translational mechanism	2224/77261	. . . . .	Laser
2224/76841	. . . . .	of the bonding head	2224/77262	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/76842	. . . . .	Rotational mechanism	2224/77263	. . . . .	in the upper part of the bonding apparatus, e.g. in the wedge
2224/76843	. . . . .	Pivoting mechanism	2224/77264	. . . . .	by induction heating, i.e. coils
2224/769	. . . . .	Means for monitoring the connection process	2224/77265	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/76901	. . . . .	using a computer, e.g. fully- or semi-automatic bonding	2224/77266	. . . . .	in the upper part of the bonding apparatus, e.g. in the wedge
2224/7692	. . . . .	Load or pressure adjusting means, e.g. sensors	2224/77267	. . . . .	Flame torch, e.g. hydrogen torch
2224/76925	. . . . .	Vibration adjusting means, e.g. sensors	2224/77268	. . . . .	Discharge electrode
2224/7695	. . . . .	Means for forming additional members	2224/77269	. . . . .	Shape of the discharge electrode
2224/7698	. . . . .	specially adapted for batch processes	2224/7727	. . . . .	Material of the discharge electrode
2224/76981	. . . . .	Apparatus chuck	2224/77271	. . . . .	Circuitry of the discharge electrode
2224/76982	. . . . .	Shape	2224/77272	. . . . .	Oven
2224/76983	. . . . .	of the mounting surface	2224/7728	. . . . .	Resistance welding electrodes, i.e. for ohmic heating
2224/76984	. . . . .	of other portions	2224/77281	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/76985	. . . . .	Material	2224/77282	. . . . .	in the upper part of the bonding apparatus, e.g. in the wedge
2224/76986	. . . . .	Auxiliary members on the pressing surface	2224/77283	. . . . .	by infrared heating, e.g. infrared heating lamp
2224/76987	. . . . .	Shape of the auxiliary member	2224/773	. . . . .	by means of pressure
2224/76988	. . . . .	Material of the auxiliary member	2224/77313	. . . . .	Wedge
2224/77	. . . . .	Apparatus for connecting with strap connectors	2224/77314	. . . . .	Shape
2224/77001	. . . . .	Calibration means	2224/77315	. . . . .	of the pressing surface, e.g. tip or head
2224/7701	. . . . .	Means for cleaning, e.g. brushes, for hydro blasting, for ultrasonic cleaning, for dry ice blasting, using gas-flow, by etching, by applying flux or plasma	2224/77316	. . . . .	comprising protrusions
2224/771	. . . . .	Means for controlling the bonding environment, e.g. valves, vacuum pumps	2224/77317	. . . . .	of other portions
2224/77101	. . . . .	Chamber	2224/77318	. . . . .	inside the capillary
2224/77102	. . . . .	Vacuum chamber	2224/77319	. . . . .	outside the capillary
2224/7711	. . . . .	High pressure chamber	2224/7732	. . . . .	Removable wedge
2224/7715	. . . . .	Means for applying permanent coating, e.g. in-situ coating	2224/77321	. . . . .	Material
2224/77151	. . . . .	Means for direct writing	2224/77325	. . . . .	Auxiliary members on the pressing surface
2224/77152	. . . . .	Syringe	2224/77326	. . . . .	Removable auxiliary member
2224/77153	. . . . .	integrated into the capillary or wedge	2224/77327	. . . . .	Shape of the auxiliary member
2224/77155	. . . . .	Jetting means, e.g. ink jet	2224/77328	. . . . .	Material of the auxiliary member
2224/77158	. . . . .	including a laser	2224/77343	. . . . .	by ultrasonic vibrations
2224/77161	. . . . .	Means for screen printing, e.g. roller, squeegee, screen stencil	2224/77344	. . . . .	Eccentric cams
2224/7717	. . . . .	Means for applying a preform, e.g. laminator	2224/77345	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/77171	. . . . .	including a vacuum-bag	2224/77346	. . . . .	in the upper part of the bonding apparatus, e.g. in the wedge
2224/7718	. . . . .	Means for blanket deposition	2224/77347	. . . . .	Piezoelectric transducers
2224/77181	. . . . .	for spin coating, i.e. spin coater	2224/77348	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/77182	. . . . .	for curtain coating	2224/77349	. . . . .	in the upper part of the bonding apparatus, e.g. in the wedge
2224/77183	. . . . .	for immersion coating, i.e. bath	2224/7735	. . . . .	Stable and mobile yokes
2224/77184	. . . . .	for spray coating, i.e. nozzle	2224/77351	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/77185	. . . . .	Means for physical vapour deposition [PVD], e.g. evaporation, sputtering			
2224/77186	. . . . .	Means for sputtering, e.g. target			
2224/77187	. . . . .	Means for evaporation			
2224/77188	. . . . .	Means for chemical vapour deposition [CVD], e.g. for laser CVD			
2224/77189	. . . . .	Means for plating, e.g. for electroplating, electroless plating			

2224/77352	. . . . .	in the upper part of the bonding apparatus, e.g. in the wedge	2224/77821	. . . .	Upper part of the bonding apparatus, i.e. bonding head, e.g. capillary or wedge
2224/77353	. . . . .	Ultrasonic horns	2224/77822	. . . . .	Rotational mechanism
2224/77354	. . . . .	in the lower part of the bonding apparatus, e.g. in the mounting chuck	2224/77823	. . . . .	Pivoting mechanism
2224/77355	. . . . .	Design, e.g. of the wave guide	2224/77824	. . . . .	Translational mechanism
2224/775	. . .	Cooling means	2224/77841	. . . .	of the pressing portion, e.g. tip or head
2224/77501	. . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/77842	. . . . .	Rotational mechanism
2224/77502	. . . .	in the upper part of the bonding apparatus, e.g. in the wedge	2224/77843	. . . . .	Pivoting mechanism
2224/7755	. . .	Mechanical means, e.g. for severing, pressing, stamping	2224/779	. . .	Means for monitoring the connection process
2224/776	. . .	Means for supplying the connector to be connected in the bonding apparatus	2224/77901	. . . .	using a computer, e.g. fully- or semi-automatic bonding
2224/77601	. . . .	Storing means	2224/7792	. . . .	Load or pressure adjusting means, e.g. sensors
2224/77611	. . . .	Feeding means	2224/77925	. . . .	Vibration adjusting means, e.g. sensors
2224/77621	. . . .	Holding means, e.g. wire claspers	2224/7795	. . .	Means for forming additional members
2224/77631	. . . .	Means for wire tension adjustments	2224/7798	. . .	specially adapted for batch processes
2224/7765	. . .	Means for transporting the components to be connected	2224/77981	. . .	Apparatus chuck
2224/77651	. . . .	Belt conveyor	2224/77982	. . . .	Shape
2224/77652	. . . .	Chain conveyor	2224/77983	. . . . .	of the mounting surface
2224/77653	. . . .	Vibrating conveyor	2224/77984	. . . . .	of other portions
2224/77654	. . . .	Pneumatic conveyor	2224/77985	. . . .	Material
2224/77655	. . . .	in a fluid	2224/77986	. . . .	Auxiliary members on the pressing surface
2224/777	. . .	Means for aligning	2224/77987	. . . . .	Shape of the auxiliary member
2224/77701	. . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/77988	. . . . .	Material of the auxiliary member
2224/77702	. . . .	in the upper part of the bonding apparatus, e.g. in the wedge	2224/78	. . .	Apparatus for connecting with wire connectors
2224/77703	. . . .	Mechanical holding means	2224/78001	. . .	Calibration means
2224/77704	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/7801	. . .	Means for cleaning, e.g. brushes, for hydro blasting, for ultrasonic cleaning, for dry ice blasting, using gas-flow, by etching, by applying flux or plasma
2224/77705	. . . . .	in the upper part of the bonding apparatus, e.g. in the wedge	2224/781	. . .	Means for controlling the bonding environment, e.g. valves, vacuum pumps
2224/77723	. . . .	Electrostatic holding means	2224/78101	. . . .	Chamber
2224/77724	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/78102	. . . . .	Vacuum chamber
2224/77725	. . . . .	in the upper part of the bonding apparatus, e.g. in the wedge	2224/7811	. . . .	High pressure chamber
2224/77733	. . . .	Magnetic holding means	2224/7815	. . .	Means for applying permanent coating, e.g. in-situ coating
2224/77734	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/782	. . .	Protection means against electrical discharge
2224/77735	. . . . .	in the upper part of the bonding apparatus, e.g. in the wedge	2224/7825	. . .	Means for applying energy, e.g. heating means
2224/77743	. . . .	Suction holding means	2224/78251	. . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/77744	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/78252	. . . . .	in the upper part of the bonding apparatus, e.g. in the capillary or wedge
2224/77745	. . . . .	in the upper part of the bonding apparatus, e.g. in the wedge	2224/78253	. . . .	adapted for localised heating
2224/77753	. . . .	Means for optical alignment, e.g. sensors	2224/7826	. . . .	Polychromatic heating lamp
2224/77754	. . . .	Guiding structures	2224/78261	. . . .	Laser
2224/77755	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/78262	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/77756	. . . . .	in the upper part of the bonding apparatus, e.g. in the wedge	2224/78263	. . . . .	in the upper part of the bonding apparatus, e.g. in the capillary or wedge
2224/778	. . .	Means for moving parts	2224/78264	. . . .	by induction heating, i.e. coils
2224/77801	. . . .	Lower part of the bonding apparatus, e.g. XY table	2224/78265	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/77802	. . . . .	Rotational mechanism	2224/78266	. . . . .	in the upper part of the bonding apparatus, e.g. in the capillary or wedge
2224/77803	. . . . .	Pivoting mechanism	2224/78267	. . . .	Flame torch, e.g. hydrogen torch
2224/77804	. . . . .	Translational mechanism	2224/78268	. . . .	Discharge electrode
			2224/78269	. . . . .	Shape of the discharge electrode
			2224/7827	. . . . .	Material of the discharge electrode
			2224/78271	. . . . .	Circuitry of the discharge electrode
			2224/78272	. . . .	Oven
			2224/7828	. . . .	Resistance welding electrodes, i.e. for ohmic heating

2224/78281	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/78502	. . . . .	in the upper part of the bonding apparatus, e.g. in the capillary or wedge
2224/78282	. . . . .	in the upper part of the bonding apparatus, e.g. in the capillary or wedge	2224/7855	. . . .	Mechanical means, e.g. for severing, pressing, stamping
2224/78283	. . . . .	by infrared heating, e.g. infrared heating lamp	2224/786	. . . .	Means for supplying the connector to be connected in the bonding apparatus
2224/783	. . . . .	by means of pressure	2224/78601	. . . . .	Storing means
2224/78301	. . . . .	Capillary	2224/78611	. . . . .	Feeding means
2224/78302	. . . . .	Shape	2224/78621	. . . . .	Holding means, e.g. wire clampers
2224/78303	. . . . .	of the pressing surface, e.g. tip or head	2224/78631	. . . . .	Means for wire tension adjustments
2224/78304	. . . . .	comprising protrusions	2224/7865	. . . .	Means for transporting the components to be connected
2224/78305	. . . . .	of other portions	2224/78651	. . . . .	Belt conveyor
2224/78306	. . . . .	inside the capillary	2224/78652	. . . . .	Chain conveyor
2224/78307	. . . . .	outside the capillary	2224/78653	. . . . .	Vibrating conveyor
2224/78308	. . . . .	Removable capillary	2224/78654	. . . . .	Pneumatic conveyor
2224/78309	. . . . .	Material	2224/78655	. . . . .	in a fluid
2224/7831	. . . . .	Auxiliary members on the pressing surface	2224/787	. . . .	Means for aligning
2224/78311	. . . . .	Removable auxiliary member	2224/78701	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/78312	. . . . .	Shape of the auxiliary member	2224/78702	. . . . .	in the upper part of the bonding apparatus, e.g. in the capillary or wedge
2224/78313	. . . . .	Wedge	2224/78703	. . . . .	Mechanical holding means
2224/78314	. . . . .	Shape	2224/78704	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/78315	. . . . .	of the pressing surface, e.g. tip or head	2224/78705	. . . . .	in the upper part of the bonding apparatus, e.g. in the capillary or wedge
2224/78316	. . . . .	comprising protrusions	2224/78723	. . . . .	Electrostatic holding means
2224/78317	. . . . .	of other portions	2224/78724	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/78318	. . . . .	inside the capillary	2224/78725	. . . . .	in the upper part of the bonding apparatus, e.g. in the capillary or wedge
2224/78319	. . . . .	outside the capillary	2224/78733	. . . . .	Magnetic holding means
2224/7832	. . . . .	Removable wedge	2224/78734	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/78321	. . . . .	Material	2224/78735	. . . . .	in the upper part of the bonding apparatus, e.g. in the capillary or wedge
2224/78325	. . . . .	Auxiliary members on the pressing surface	2224/78743	. . . . .	Suction holding means
2224/78326	. . . . .	Removable auxiliary member	2224/78744	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/78327	. . . . .	Shape of the auxiliary member	2224/78745	. . . . .	in the upper part of the bonding apparatus, e.g. in the capillary or wedge
2224/78328	. . . . .	Material of the auxiliary member	2224/78753	. . . . .	Means for optical alignment, e.g. sensors
2224/78343	. . . . .	by ultrasonic vibrations	2224/78754	. . . . .	Guiding structures
2224/78344	. . . . .	Eccentric cams	2224/78755	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/78345	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/78756	. . . . .	in the upper part of the bonding apparatus, e.g. in the capillary or wedge
2224/78346	. . . . .	in the upper part of the bonding apparatus, e.g. in the capillary or wedge	2224/788	. . . .	Means for moving parts
2224/78347	. . . . .	Piezoelectric transducers	2224/78801	. . . . .	Lower part of the bonding apparatus, e.g. XY table
2224/78348	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/78802	. . . . .	Rotational mechanism
2224/78349	. . . . .	in the upper part of the bonding apparatus, e.g. in the capillary or wedge	2224/78803	. . . . .	Pivoting mechanism
2224/7835	. . . . .	Stable and mobile yokes	2224/78804	. . . . .	Translational mechanism
2224/78351	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/78821	. . . . .	Upper part of the bonding apparatus, i.e. bonding head, e.g. capillary or wedge
2224/78352	. . . . .	in the upper part of the bonding apparatus, e.g. in the capillary or wedge	2224/78822	. . . . .	Rotational mechanism
2224/78353	. . . . .	Ultrasonic horns	2224/78823	. . . . .	Pivoting mechanism
2224/78354	. . . . .	in the lower part of the bonding apparatus, e.g. in the mounting chuck	2224/78824	. . . . .	Translational mechanism
2224/78355	. . . . .	Design, e.g. of the wave guide	2224/78841	. . . . .	of the pressing portion, e.g. tip or head
2224/785	. . . .	Cooling means	2224/78842	. . . . .	Rotational mechanism
2224/78501	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/78843	. . . . .	Pivoting mechanism
			2224/789	. . . .	Means for monitoring the connection process

2224/78901	. . . .	using a computer, e.g. fully- or semi-automatic bonding	2224/79264	. . . .	by induction heating, i.e. coils
2224/7892	. . . .	Load or pressure adjusting means, e.g. sensors	2224/79265	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/78925	. . . .	Vibration adjusting means, e.g. sensors	2224/79266	. . . . .	in the upper part of the bonding apparatus, e.g. in the pressing head
2224/7895	. . . .	Means for forming additional members	2224/79267	. . . . .	Flame torch, e.g. hydrogen torch
2224/7898	. . . .	specially adapted for batch processes	2224/79268	. . . . .	Discharge electrode
2224/78981	. . . .	Apparatus chuck	2224/79269	. . . . .	Shape of the discharge electrode
2224/78982	. . . .	Shape	2224/7927	. . . . .	Material of the discharge electrode
2224/78983	. . . . .	of the mounting surface	2224/79271	. . . . .	Circuitry of the discharge electrode
2224/78984	. . . . .	of other portions	2224/79272	. . . . .	Oven
2224/78985	. . . . .	Material	2224/7928	. . . . .	Resistance welding electrodes, i.e. for ohmic heating
2224/78986	. . . . .	Auxiliary members on the pressing surface	2224/79281	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/78987	. . . . .	Shape of the auxiliary member	2224/79282	. . . . .	in the upper part of the bonding apparatus, e.g. in the pressing head
2224/78988	. . . . .	Material of the auxiliary member	2224/79283	. . . . .	by infrared heating, e.g. infrared heating lamp
2224/79	. . . .	Apparatus for Tape Automated Bonding [TAB]	2224/793	. . . . .	by means of pressure
2224/79001	. . . .	Calibration means	2224/79301	. . . . .	Pressing head
2224/7901	. . . .	Means for cleaning, e.g. brushes, for hydro blasting, for ultrasonic cleaning, for dry ice blasting, using gas-flow, by etching, by applying flux or plasma	2224/79302	. . . . .	Shape
2224/791	. . . .	Means for controlling the bonding environment, e.g. valves, vacuum pumps	2224/79303	. . . . .	of the pressing surface
2224/79101	. . . . .	Chamber	2224/79304	. . . . .	being curved
2224/79102	. . . . .	Vacuum chamber	2224/79305	. . . . .	comprising protrusions
2224/7911	. . . . .	High pressure chamber	2224/7931	. . . . .	of other parts
2224/7915	. . . .	Means for applying permanent coating	2224/79312	. . . . .	Material
2224/79151	. . . . .	Means for direct writing	2224/79313	. . . . .	Removable pressing head
2224/79152	. . . . .	Syringe	2224/79314	. . . . .	Auxiliary members on the pressing surface
2224/79153	. . . . .	integrated into the pressing head	2224/79315	. . . . .	Elastomer inlay
2224/79155	. . . . .	Jetting means, e.g. ink jet	2224/79316	. . . . .	with retaining mechanisms
2224/79158	. . . . .	including a laser	2224/79317	. . . . .	Removable auxiliary member
2224/79161	. . . . .	Means for screen printing, e.g. roller, squeegee, screen stencil	2224/79318	. . . . .	Shape of the auxiliary member
2224/7917	. . . . .	Means for applying a preform, e.g. laminator	2224/7932	. . . . .	Material of the auxiliary member
2224/79171	. . . . .	including a vacuum-bag	2224/79343	. . . . .	by ultrasonic vibrations
2224/7918	. . . . .	Means for blanket deposition	2224/79344	. . . . .	Eccentric cams
2224/79181	. . . . .	for spin coating, i.e. spin coater	2224/79345	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/79182	. . . . .	for curtain coating	2224/79346	. . . . .	in the upper part of the bonding apparatus, e.g. in the pressing head
2224/79183	. . . . .	for immersion coating, i.e. bath	2224/79347	. . . . .	Piezoelectric transducers
2224/79184	. . . . .	for spray coating, i.e. nozzle	2224/79348	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/79185	. . . . .	Means for physical vapour deposition [PVD], e.g. evaporation, sputtering	2224/79349	. . . . .	in the upper part of the bonding apparatus, e.g. in the pressing head
2224/79186	. . . . .	Means for sputtering, e.g. target	2224/7935	. . . . .	Stable and mobile yokes
2224/79187	. . . . .	Means for evaporation	2224/79351	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/79188	. . . . .	Means for chemical vapour deposition [CVD], e.g. for laser CVD	2224/79352	. . . . .	in the upper part of the bonding apparatus, e.g. in the pressing head
2224/79189	. . . . .	Means for plating, e.g. for electroplating, electroless plating	2224/79353	. . . . .	Ultrasonic horns
2224/792	. . . .	Protection means against electrical discharge	2224/79354	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/7925	. . . .	Means for applying energy, e.g. heating means	2224/79355	. . . . .	Design, e.g. of the wave guide
2224/79251	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck	2224/795	. . . .	Cooling means
2224/79252	. . . . .	in the upper part of the bonding apparatus, e.g. in the pressing head	2224/79501	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/79253	. . . . .	adapted for localised heating	2224/79502	. . . . .	in the upper part of the bonding apparatus, e.g. in the pressing head
2224/7926	. . . . .	Polychromatic heating lamp	2224/7955	. . . .	Mechanical means, e.g. for pressing, stamping
2224/79261	. . . . .	Laser	2224/796	. . . .	Means for supplying the connector to be connected in the bonding apparatus
2224/79262	. . . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck			
2224/79263	. . . . .	in the upper part of the bonding apparatus, e.g. in the pressing head			

- 2224/79601 Storing means
- 2224/79611 Feeding means
- 2224/79621 Holding means
- 2224/7965 . . . Means for transporting the components to be connected
- 2224/79651 Belt conveyor
- 2224/79652 Chain conveyor
- 2224/79653 Vibrating conveyor
- 2224/79654 Pneumatic conveyor
- 2224/79655 in a fluid
- 2224/797 . . . Means for aligning
- 2224/79701 in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79702 in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/79703 Mechanical holding means
- 2224/79704 in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79705 in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/79723 Electrostatic holding means
- 2224/79724 in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79725 in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/79733 Magnetic holding means
- 2224/79734 in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79735 in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/79743 Suction holding means
- 2224/79744 in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79745 in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/79753 Means for optical alignment, e.g. sensors
- 2224/79754 Guiding structures
- 2224/79755 in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79756 in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/798 . . . Means for moving parts
- 2224/79801 Lower part of the bonding apparatus, e.g. XY table
- 2224/79802 Rotational mechanism
- 2224/79803 Pivoting mechanism
- 2224/79804 Translational mechanism
- 2224/79821 Upper part of the bonding apparatus, i.e. pressing head
- 2224/79822 Rotational mechanism
- 2224/79823 Pivoting mechanism
- 2224/79824 Translational mechanism
- 2224/79841 of the pressing head
- 2224/79842 Rotational mechanism
- 2224/79843 Pivoting mechanism
- 2224/799 . . . Means for monitoring the connection process
- 2224/79901 using a computer, e.g. fully- or semi-automatic bonding
- 2224/7992 Load or pressure adjusting means, e.g. sensors
- 2224/79925 Vibration adjusting means, e.g. sensors
- 2224/7995 . . . Means for forming additional members
- 2224/7998 . . . specially adapted for batch processes
- 2224/79981 . . . Apparatus chuck
- 2224/79982 Shape
- 2224/79983 of the mounting surface
- 2224/79984 of other portions
- 2224/79985 Material
- 2224/79986 Auxiliary members on the pressing surface
- 2224/79987 Shape of the auxiliary member
- 2224/79988 Material of the auxiliary member
- 2224/7999 . . . for disconnecting
- 2224/80 . . . Methods for connecting semiconductor or other solid state bodies using means for bonding being attached to, or being formed on, the surface to be connected
- 2224/80001 . . . by connecting a bonding area directly to another bonding area, i.e. connectorless bonding, e.g. bumpless bonding
- 2224/80003 . . . involving a temporary auxiliary member not forming part of the bonding apparatus
- 2224/80004 being a removable or sacrificial coating
- 2224/80006 being a temporary or sacrificial substrate
- 2224/80007 . . . involving a permanent auxiliary member being left in the finished device, e.g. aids for protecting the bonding area during or after the bonding process
- 2224/80009 . . . Pre-treatment of the bonding area
- 2224/8001 Cleaning the bonding area, e.g. oxide removal step, desmearing
- 2224/80011 Chemical cleaning, e.g. etching, flux
- 2224/80012 Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow
- 2224/80013 Plasma cleaning
- 2224/80014 Thermal cleaning, e.g. decomposition, sublimation
- 2224/80019 Combinations of two or more cleaning methods provided for in at least two different groups from [H01L 2224/8001](#) - [H01L 2224/80014](#)
- 2224/8002 Applying permanent coating to the bonding area in the bonding apparatus, e.g. in-situ coating
- 2224/80024 Applying flux to the bonding area in the bonding apparatus
- 2224/8003 Reshaping the bonding area in the bonding apparatus, e.g. flattening the bonding area
- 2224/80031 by chemical means, e.g. etching, anodisation
- 2224/80035 by heating means
- 2224/80037 using a polychromatic heating lamp
- 2224/80039 using a laser
- 2224/80041 Induction heating, i.e. eddy currents
- 2224/80047 by mechanical means, e.g. severing, pressing, stamping
- 2224/80048 Thermal treatments, e.g. annealing, controlled pre-heating or pre-cooling
- 2224/80051 Forming additional members
- 2224/80052 . . . Detaching bonding areas, e.g. after testing ([unsoldering in general B23K 1/018](#))
- 2224/80053 . . . Bonding environment
- 2224/80054 Composition of the atmosphere
- 2224/80055 being oxidating
- 2224/80065 being reducing
- 2224/80075 being inert

2224/80085	. . . .	being a liquid, e.g. for fluidic self-assembly	2224/80211	. . . .	applying isostatic pressure, e.g. degassing using vacuum or a pressurised liquid
2224/8009	. . . .	Vacuum	2224/80213	. . . .	using a reflow oven
2224/80091	. . . .	Under pressure	2224/80215	. . . .	with a graded temperature profile
2224/80092	. . . .	Atmospheric pressure	2224/8022	. . . .	with energy being in the form of electromagnetic radiation
2224/80093	. . . .	Transient conditions, e.g. gas-flow	2224/80222	. . . .	Induction heating, i.e. eddy currents
2224/80095	. . . .	Temperature settings	2224/80224	. . . .	using a laser
2224/80096	. . . .	Transient conditions	2224/8023	. . . .	Polychromatic or infrared lamp heating
2224/80097	. . . .	Heating	2224/80232	. . . .	using an autocatalytic reaction, e.g. exothermic brazing
2224/80098	. . . .	Cooling	2224/80234	. . . .	using means for applying energy being within the device, e.g. integrated heater
2224/80099	. . . .	Ambient temperature	2224/80236	. . . .	using electro-static corona discharge
2224/8011	. . .	involving protection against electrical discharge, e.g. removing electrostatic charge	2224/80237	. . . .	using an electron beam (electron beam welding in general B23K 15/00)
2224/8012	. . .	Aligning	2224/80238	. . . .	using electric resistance welding, i.e. ohmic heating
2224/80121	. . .	Active alignment, i.e. by apparatus steering, e.g. optical alignment using marks or sensors	2224/8034	. . .	Bonding interfaces of the bonding area
2224/80122	. . . .	by detecting inherent features of, or outside, the semiconductor or solid-state body	2224/80345	. . . .	Shape, e.g. interlocking features
2224/80123	. . . .	Shape or position of the body	2224/80355	. . . .	having an external coating, e.g. protective bond-through coating
2224/80125	. . . .	Bonding areas on the body	2224/80357	. . . .	being flush with the surface
2224/80127	. . . .	Bonding areas outside the body	2224/80359	. . . .	Material
2224/80129	. . . .	Shape or position of the other item	2224/8036	. . .	Bonding interfaces of the semiconductor or solid state body
2224/8013	. . . .	using marks formed on the semiconductor or solid-state body	2224/80365	. . . .	Shape, e.g. interlocking features
2224/80132	. . . .	using marks formed outside the semiconductor or solid-state body, i.e. "off-chip"	2224/80375	. . . .	having an external coating, e.g. protective bond-through coating
2224/80136	. . . .	involving guiding structures, e.g. spacers or supporting members	2224/80379	. . . .	Material (material of the bonding area prior to the connecting process H01L 2224/05099 and H01L 2224/05599)
2224/80138	. . . .	the guiding structures being at least partially left in the finished device	2224/8038	. . .	Bonding interfaces outside the semiconductor or solid-state body
2224/80139	. . . .	Guiding structures on the body	2224/80385	. . . .	Shape, e.g. interlocking features
2224/8014	. . . .	Guiding structures outside the body	2224/80395	. . . .	having an external coating, e.g. protective bond-through coating
2224/80141	. . . .	Guiding structures both on and outside the body	2224/80399	. . . .	Material
2224/80143	. . . .	Passive alignment, i.e. self alignment, e.g. using surface energy, chemical reactions, thermal equilibrium	2224/804	. . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/80148	. . . .	involving movement of a part of the bonding apparatus	2224/80401	. . . .	the principal constituent melting at a temperature of less than 400°C
2224/80149	. . . .	being the lower part of the bonding apparatus, i.e. holding means for the bodies to be connected, e.g. XY table	2224/80405	. . . .	Gallium [Ga] as principal constituent
2224/8015	. . . .	Rotational movements	2224/80409	. . . .	Indium [In] as principal constituent
2224/8016	. . . .	Translational movements	2224/80411	. . . .	Tin [Sn] as principal constituent
2224/80169	. . . .	being the upper part of the bonding apparatus, i.e. bonding head	2224/80413	. . . .	Bismuth [Bi] as principal constituent
2224/8017	. . . .	Rotational movements	2224/80414	. . . .	Thallium [Tl] as principal constituent
2224/8018	. . . .	Translational movements	2224/80416	. . . .	Lead [Pb] as principal constituent
2224/8019	. . .	Arrangement of the bonding areas prior to mounting	2224/80417	. . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/80194	. . . .	Lateral distribution of the bonding areas	2224/80418	. . . .	Zinc [Zn] as principal constituent
2224/802	. . .	Applying energy for connecting	2224/8042	. . . .	Antimony [Sb] as principal constituent
2224/80201	. . . .	Compression bonding	2224/80423	. . . .	Magnesium [Mg] as principal constituent
2224/80203	. . . .	Thermocompression bonding, e.g. diffusion bonding, pressure joining, thermocompression welding or solid-state welding	2224/80424	. . . .	Aluminium [Al] as principal constituent
2224/80204	. . . .	with a graded temperature profile			
2224/80205	. . . .	Ultrasonic bonding			
2224/80206	. . . .	Direction of oscillation			
2224/80207	. . . .	Thermosonic bonding			
2224/80209	. . . .	applying unidirectional static pressure			

2224/80438	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/805	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/80439	. . . . .	Silver [Ag] as principal constituent	2224/80501	. . . . .	the principal constituent melting at a temperature of less than 400°C
2224/80444	. . . . .	Gold [Au] as principal constituent	2224/80505	. . . . .	Gallium [Ga] as principal constituent
2224/80447	. . . . .	Copper [Cu] as principal constituent	2224/80509	. . . . .	Indium [In] as principal constituent
2224/80449	. . . . .	Manganese [Mn] as principal constituent	2224/80511	. . . . .	Tin [Sn] as principal constituent
2224/80455	. . . . .	Nickel [Ni] as principal constituent	2224/80513	. . . . .	Bismuth [Bi] as principal constituent
2224/80457	. . . . .	Cobalt [Co] as principal constituent	2224/80514	. . . . .	Thallium [Tl] as principal constituent
2224/8046	. . . . .	Iron [Fe] as principal constituent	2224/80516	. . . . .	Lead [Pb] as principal constituent
2224/80463	. . . . .	the principal constituent melting at a temperature of greater than 1550°C	2224/80517	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/80464	. . . . .	Palladium [Pd] as principal constituent	2224/80518	. . . . .	Zinc [Zn] as principal constituent
2224/80466	. . . . .	Titanium [Ti] as principal constituent	2224/8052	. . . . .	Antimony [Sb] as principal constituent
2224/80469	. . . . .	Platinum [Pt] as principal constituent	2224/80523	. . . . .	Magnesium [Mg] as principal constituent
2224/8047	. . . . .	Zirconium [Zr] as principal constituent	2224/80524	. . . . .	Aluminium [Al] as principal constituent
2224/80471	. . . . .	Chromium [Cr] as principal constituent	2224/80538	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/80472	. . . . .	Vanadium [V] as principal constituent	2224/80539	. . . . .	Silver [Ag] as principal constituent
2224/80473	. . . . .	Rhodium [Rh] as principal constituent	2224/80544	. . . . .	Gold [Au] as principal constituent
2224/80476	. . . . .	Ruthenium [Ru] as principal constituent	2224/80547	. . . . .	Copper [Cu] as principal constituent
2224/80478	. . . . .	Iridium [Ir] as principal constituent	2224/80549	. . . . .	Manganese [Mn] as principal constituent
2224/80479	. . . . .	Niobium [Nb] as principal constituent	2224/80555	. . . . .	Nickel [Ni] as principal constituent
2224/8048	. . . . .	Molybdenum [Mo] as principal constituent	2224/80557	. . . . .	Cobalt [Co] as principal constituent
2224/80481	. . . . .	Tantalum [Ta] as principal constituent	2224/8056	. . . . .	Iron [Fe] as principal constituent
2224/80483	. . . . .	Rhenium [Re] as principal constituent	2224/80563	. . . . .	the principal constituent melting at a temperature of greater than 1550°C
2224/80484	. . . . .	Tungsten [W] as principal constituent	2224/80564	. . . . .	Palladium [Pd] as principal constituent
2224/80486	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/80566	. . . . .	Titanium [Ti] as principal constituent
2224/80487	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/80488)	2224/80569	. . . . .	Platinum [Pt] as principal constituent
2224/80488	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/8057	. . . . .	Zirconium [Zr] as principal constituent
2224/8049	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/80571	. . . . .	Chromium [Cr] as principal constituent
2224/80491	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/80572	. . . . .	Vanadium [V] as principal constituent
2224/80493	. . . . .	with a principal constituent of the material being a solid not provided for in groups H01L 2224/804 - H01L 2224/80491 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/80573	. . . . .	Rhodium [Rh] as principal constituent
2224/80494	. . . . .	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/804 - H01L 2224/80491	2224/80576	. . . . .	Ruthenium [Ru] as principal constituent
2224/80495	. . . . .	with a principal constituent of the material being a gas not provided for in groups H01L 2224/804 - H01L 2224/80491			
2224/80498	. . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams			
2224/80499	. . . . .	Material of the matrix			

2224/80578	.....	Iridium [Ir] as principal constituent	2224/80617	.....	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/80579	.....	Niobium [Nb] as principal constituent	2224/80618	.....	Zinc [Zn] as principal constituent
2224/8058	.....	Molybdenum [Mo] as principal constituent	2224/8062	.....	Antimony [Sb] as principal constituent
2224/80581	.....	Tantalum [Ta] as principal constituent	2224/80623	.....	Magnesium [Mg] as principal constituent
2224/80583	.....	Rhenium [Re] as principal constituent	2224/80624	.....	Aluminium [Al] as principal constituent
2224/80584	.....	Tungsten [W] as principal constituent	2224/80638	.....	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/80586	.....	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/80639	.....	Silver [Ag] as principal constituent
2224/80587	.....	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/80588)	2224/80644	.....	Gold [Au] as principal constituent
2224/80588	.....	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/80647	.....	Copper [Cu] as principal constituent
2224/8059	.....	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/80649	.....	Manganese [Mn] as principal constituent
2224/80591	.....	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/80655	.....	Nickel [Ni] as principal constituent
2224/80593	.....	with a principal constituent of the material being a solid not provided for in groups H01L 2224/805 - H01L 2224/80591 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/80657	.....	Cobalt [Co] as principal constituent
2224/80594	.....	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/805 - H01L 2224/80591	2224/8066	.....	Iron [Fe] as principal constituent
2224/80595	.....	with a principal constituent of the material being a gas not provided for in groups H01L 2224/805 - H01L 2224/80591	2224/80663	.....	the principal constituent melting at a temperature of greater than 1550°C
2224/80598	.....	Fillers	2224/80664	.....	Palladium [Pd] as principal constituent
2224/80599	.....	Base material	2224/80666	.....	Titanium [Ti] as principal constituent
2224/806	.....	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/80669	.....	Platinum [Pt] as principal constituent
2224/80601	.....	the principal constituent melting at a temperature of less than 400°C	2224/8067	.....	Zirconium [Zr] as principal constituent
2224/80605	.....	Gallium [Ga] as principal constituent	2224/80671	.....	Chromium [Cr] as principal constituent
2224/80609	.....	Indium [In] as principal constituent	2224/80672	.....	Vanadium [V] as principal constituent
2224/80611	.....	Tin [Sn] as principal constituent	2224/80673	.....	Rhodium [Rh] as principal constituent
2224/80613	.....	Bismuth [Bi] as principal constituent	2224/80676	.....	Ruthenium [Ru] as principal constituent
2224/80614	.....	Thallium [Tl] as principal constituent	2224/80678	.....	Iridium [Ir] as principal constituent
2224/80616	.....	Lead [Pb] as principal constituent	2224/80679	.....	Niobium [Nb] as principal constituent
			2224/8068	.....	Molybdenum [Mo] as principal constituent
			2224/80681	.....	Tantalum [Ta] as principal constituent
			2224/80683	.....	Rhenium [Re] as principal constituent
			2224/80684	.....	Tungsten [W] as principal constituent
			2224/80686	.....	with a principal constituent of the material being a non metallic, non metalloid inorganic material

2224/80687	.....	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/80688)	2224/80724	.....	Aluminium [Al] as principal constituent
2224/80688	.....	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/80738	.....	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/8069	.....	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/80739	.....	Silver [Ag] as principal constituent
2224/80691	.....	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/80744	.....	Gold [Au] as principal constituent
2224/80693	.....	with a principal constituent of the material being a solid not provided for in groups H01L 2224/806 - H01L 2224/80691 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/80747	.....	Copper [Cu] as principal constituent
2224/80694	.....	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/806 - H01L 2224/80691	2224/80749	.....	Manganese [Mn] as principal constituent
2224/80695	.....	with a principal constituent of the material being a gas not provided for in groups H01L 2224/806 - H01L 2224/80691	2224/80755	.....	Nickel [Ni] as principal constituent
2224/80698	.....	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/80757	.....	Cobalt [Co] as principal constituent
2224/80699	.....	Coating material	2224/8076	.....	Iron [Fe] as principal constituent
2224/807	.....	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/80763	.....	the principal constituent melting at a temperature of greater than 1550°C
2224/80701	.....	the principal constituent melting at a temperature of less than 400°C	2224/80764	.....	Palladium [Pd] as principal constituent
2224/80705	.....	Gallium [Ga] as principal constituent	2224/80766	.....	Titanium [Ti] as principal constituent
2224/80709	.....	Indium [In] as principal constituent	2224/80769	.....	Platinum [Pt] as principal constituent
2224/80711	.....	Tin [Sn] as principal constituent	2224/8077	.....	Zirconium [Zr] as principal constituent
2224/80713	.....	Bismuth [Bi] as principal constituent	2224/80771	.....	Chromium [Cr] as principal constituent
2224/80714	.....	Thallium [Tl] as principal constituent	2224/80772	.....	Vanadium [V] as principal constituent
2224/80716	.....	Lead [Pb] as principal constituent	2224/80773	.....	Rhodium [Rh] as principal constituent
2224/80717	.....	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/80776	.....	Ruthenium [Ru] as principal constituent
2224/80718	.....	Zinc [Zn] as principal constituent	2224/80778	.....	Iridium [Ir] as principal constituent
2224/8072	.....	Antimony [Sb] as principal constituent	2224/80779	.....	Niobium [Nb] as principal constituent
2224/80723	.....	Magnesium [Mg] as principal constituent	2224/8078	.....	Molybdenum [Mo] as principal constituent
			2224/80781	.....	Tantalum [Ta] as principal constituent
			2224/80783	.....	Rhenium [Re] as principal constituent
			2224/80784	.....	Tungsten [W] as principal constituent
			2224/80786	.....	with a principal constituent of the material being a non metallic, non metalloid inorganic material
			2224/80787	.....	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/80788)
			2224/80788	.....	Glasses, e.g. amorphous oxides, nitrides or fluorides
			2224/8079	.....	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy

2224/80791	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/80893	. . . .	Anodic bonding, i.e. bonding by applying a voltage across the interface in order to induce ions migration leading to an irreversible chemical bond
2224/80793	. . . . .	with a principal constituent of the material being a solid not provided for in groups H01L 2224/807 - H01L 2224/80791 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/80894	. . . .	Direct bonding, i.e. joining surfaces by means of intermolecular attracting interactions at their interfaces, e.g. covalent bonds, van der Waals forces
2224/80794	. . . . .	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/807 - H01L 2224/80791	2224/80895	. . . . .	between electrically conductive surfaces, e.g. copper-copper direct bonding, surface activated bonding
2224/80795	. . . . .	with a principal constituent of the material being a gas not provided for in groups H01L 2224/807 - H01L 2224/80791	2224/80896	. . . . .	between electrically insulating surfaces, e.g. oxide or nitride layers
2224/80798	. . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/80897	. . . .	Mechanical interlocking, e.g. anchoring, hook and loop-type fastening or the like
2224/80799	. . . . .	Shape or distribution of the fillers	2224/80898	. . . . .	Press-fitting, i.e. pushing the parts together and fastening by friction, e.g. by compression of one part against the other
2224/808	. . .	Bonding techniques	2224/80899	. . . . .	using resilient parts in the bonding area
2224/80801	. . . .	Soldering or alloying	2224/809	. . .	with the bonding area not providing any mechanical bonding
2224/80805	. . . . .	involving forming a eutectic alloy at the bonding interface	2224/80901	. . . .	Pressing a bonding area against another bonding area by means of a further bonding area or connector (detachable pressure contact H01L 2224/72)
2224/8081	. . . . .	involving forming an intermetallic compound at the bonding interface	2224/80902	. . . . .	by means of a further bonding area
2224/80815	. . . . .	Reflow soldering	2224/80903	. . . . .	by means of a bump or layer connector
2224/8082	. . . . .	Diffusion bonding	2224/80904	. . . . .	by means of an encapsulation layer or foil
2224/80825	. . . . .	Solid-liquid interdiffusion	2224/80905	. . . .	Combinations of bonding methods provided for in at least two different groups from H01L 2224/808 - H01L 2224/80904
2224/8083	. . . . .	Solid-solid interdiffusion	2224/80906	. . . . .	Specific sequence of method steps
2224/8084	. . . . .	Sintering	2224/80907	. . . . .	Intermediate bonding, i.e. intermediate bonding step for temporarily bonding the semiconductor or solid-state body, followed by at least a further bonding step
2224/8085	. . . . .	using a polymer adhesive, e.g. an adhesive based on silicone, epoxy, polyimide, polyester	2224/80908	. . . .	involving monitoring, e.g. feedback loop
2224/80855	. . . . .	Hardening the adhesive by curing, i.e. thermosetting	2224/80909	. . . .	Post-treatment of the bonding area
2224/80856	. . . . .	Pre-cured adhesive, i.e. B-stage adhesive	2224/8091	. . . . .	Cleaning, e.g. oxide removal step, desmearing
2224/80859	. . . . .	Localised curing of parts of the bonding area	2224/80911	. . . . .	Chemical cleaning, e.g. etching, flux
2224/80862	. . . . .	Heat curing	2224/80912	. . . . .	Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow
2224/80865	. . . . .	Microwave curing	2224/80913	. . . . .	Plasma cleaning
2224/80868	. . . . .	Infrared [IR] curing	2224/80914	. . . . .	Thermal cleaning, e.g. using laser ablation or by electrostatic corona discharge
2224/80871	. . . . .	Visible light curing	2224/80919	. . . . .	Combinations of two or more cleaning methods provided for in at least two different groups from H01L 2224/8091 - H01L 2224/80914
2224/80874	. . . . .	Ultraviolet [UV] curing	2224/8092	. . . . .	Applying permanent coating, e.g. protective coating
2224/80877	. . . . .	Moisture curing, i.e. curing by exposing to humidity, e.g. for silicones and polyurethanes	2224/8093	. . . . .	Reshaping
2224/8088	. . . . .	Hardening the adhesive by cooling, e.g. for thermoplastics or hot-melt adhesives	2224/80931	. . . . .	by chemical means, e.g. etching
2224/80885	. . . . .	Combinations of two or more hardening methods provided for in at least two different groups from H01L 2224/80855 - H01L 2224/8088 , e.g. for hybrid thermoplastic-thermosetting adhesives	2224/80935	. . . . .	by heating means, e.g. reflowing
2224/8089	. . . . .	using an inorganic non metallic glass type adhesive, e.g. solder glass	2224/80937	. . . . .	using a polychromatic heating lamp
			2224/80939	. . . . .	using a laser
			2224/80941	. . . . .	Induction heating, i.e. eddy currents
			2224/80943	. . . . .	using a flame torch, e.g. hydrogen torch
			2224/80945	. . . . .	using a corona discharge, e.g. electronic flame off [EFO]
			2224/80947	. . . . .	by mechanical means, e.g. pull-and-cut, pressing, stamping

2224/80948	. . . .	Thermal treatments, e.g. annealing, controlled cooling	2224/81093	. . . . .	Transient conditions, e.g. gas-flow
2224/80951	. . . .	Forming additional members, e.g. for reinforcing	2224/81095	. . . . .	Temperature settings
2224/80986	. . . .	Specific sequence of steps, e.g. repetition of manufacturing steps, time sequence	2224/81096	. . . . .	Transient conditions
2224/81	. . . .	using a bump connector	2224/81097	. . . . .	Heating
2224/81001	. . . .	involving a temporary auxiliary member not forming part of the bonding apparatus	2224/81098	. . . . .	Cooling
2224/81002	. . . .	being a removable or sacrificial coating	2224/81099	. . . . .	Ambient temperature
2224/81005	. . . .	being a temporary or sacrificial substrate	2224/811	. . . .	the bump connector being supplied to the parts to be connected in the bonding apparatus
2224/81007	. . . .	involving a permanent auxiliary member being left in the finished device, e.g. aids for holding or protecting the bump connector during or after the bonding process	2224/81101	. . . .	as prepeg comprising a bump connector, e.g. provided in an insulating plate member
2224/81009	. . . .	Pre-treatment of the bump connector or the bonding area	2224/8111	. . . .	involving protection against electrical discharge, e.g. removing electrostatic charge
2224/8101	. . . .	Cleaning the bump connector, e.g. oxide removal step, desmearing	2224/8112	. . . .	Aligning
2224/81011	. . . . .	Chemical cleaning, e.g. etching, flux	2224/81121	. . . .	Active alignment, i.e. by apparatus steering, e.g. optical alignment using marks or sensors
2224/81012	. . . . .	Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow	2224/81122	. . . . .	by detecting inherent features of, or outside, the semiconductor or solid-state body
2224/81013	. . . . .	Plasma cleaning	2224/81123	. . . . .	Shape or position of the body
2224/81014	. . . . .	Thermal cleaning, e.g. decomposition, sublimation	2224/81125	. . . . .	Bonding areas on the body
2224/81019	. . . . .	Combinations of two or more cleaning methods provided for in at least two different groups from H01L 2224/8101 - H01L 2224/81014	2224/81127	. . . . .	Bonding areas outside the body
2224/8102	. . . . .	Applying permanent coating to the bump connector in the bonding apparatus, e.g. in-situ coating	2224/81129	. . . . .	Shape or position of the other item
2224/81022	. . . . .	Cleaning the bonding area, e.g. oxide removal step, desmearing	2224/8113	. . . . .	using marks formed on the semiconductor or solid-state body
2224/81024	. . . . .	Applying flux to the bonding area	2224/81132	. . . . .	using marks formed outside the semiconductor or solid-state body, i.e. "off-chip"
2224/81026	. . . . .	Applying a precursor material to the bonding area	2224/81136	. . . . .	involving guiding structures, e.g. spacers or supporting members
2224/8103	. . . . .	Reshaping the bump connector in the bonding apparatus, e.g. flattening the bump connector	2224/81138	. . . . .	the guiding structures being at least partially left in the finished device
2224/81031	. . . . .	by chemical means, e.g. etching, anodisation	2224/81139	. . . . .	Guiding structures on the body
2224/81035	. . . . .	by heating means	2224/8114	. . . . .	Guiding structures outside the body
2224/81037	. . . . .	using a polychromatic heating lamp	2224/81141	. . . . .	Guiding structures both on and outside the body
2224/81039	. . . . .	using a laser	2224/81143	. . . . .	Passive alignment, i.e. self alignment, e.g. using surface energy, chemical reactions, thermal equilibrium
2224/81041	. . . . .	Induction heating, i.e. eddy currents	2224/81148	. . . . .	involving movement of a part of the bonding apparatus
2224/81047	. . . . .	by mechanical means, e.g. severing, pressing, stamping	2224/81149	. . . . .	being the lower part of the bonding apparatus, i.e. holding means for the bodies to be connected, e.g. XY table
2224/81048	. . . . .	Thermal treatments, e.g. annealing, controlled pre-heating or pre-cooling	2224/8115	. . . . .	Rotational movements
2224/81051	. . . . .	Forming additional members	2224/8116	. . . . .	Translational movements
2224/81052	. . . . .	Detaching bump connectors, e.g. after testing (unsoldering in general B23K 1/018)	2224/81169	. . . . .	being the upper part of the bonding apparatus, i.e. bonding head
2224/81053	. . . . .	Bonding environment	2224/8117	. . . . .	Rotational movements
2224/81054	. . . . .	Composition of the atmosphere	2224/8118	. . . . .	Translational movements
2224/81055	. . . . .	being oxidating	2224/8119	. . . . .	Arrangement of the bump connectors prior to mounting
2224/81065	. . . . .	being reducing	2224/81191	. . . . .	wherein the bump connectors are disposed only on the semiconductor or solid-state body
2224/81075	. . . . .	being inert	2224/81192	. . . . .	wherein the bump connectors are disposed only on another item or body to be connected to the semiconductor or solid-state body
2224/81085	. . . . .	being a liquid, e.g. for fluidic self-assembly	2224/81193	. . . . .	wherein the bump connectors are disposed on both the semiconductor or solid-state body and another item or body to be connected to the semiconductor or solid-state body
2224/8109	. . . . .	Vacuum	2224/81194	. . . . .	Lateral distribution of the bump connectors
2224/81091	. . . . .	Under pressure	2224/812	. . . . .	Applying energy for connecting
2224/81092	. . . . .	Atmospheric pressure			

2224/81201	. . . .	Compression bonding	2224/81417	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/81203	. . . .	Thermocompression bonding, e.g. diffusion bonding, pressure joining, thermocompression welding or solid-state welding	2224/81418	. . . . .	Zinc [Zn] as principal constituent
2224/81204	. . . . .	with a graded temperature profile	2224/8142	. . . . .	Antimony [Sb] as principal constituent
2224/81205	. . . . .	Ultrasonic bonding	2224/81423	. . . . .	Magnesium [Mg] as principal constituent
2224/81206	. . . . .	Direction of oscillation	2224/81424	. . . . .	Aluminium [Al] as principal constituent
2224/81207	. . . . .	Thermosonic bonding	2224/81438	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/81208	. . . . .	applying unidirectional static pressure	2224/81439	. . . . .	Silver [Ag] as principal constituent
2224/81209	. . . . .	applying isostatic pressure, e.g. degassing using vacuum or a pressurised liquid	2224/81444	. . . . .	Gold [Au] as principal constituent
2224/8121	. . . . .	using a reflow oven	2224/81447	. . . . .	Copper [Cu] as principal constituent
2224/81211	. . . . .	with a graded temperature profile	2224/81449	. . . . .	Manganese [Mn] as principal constituent
2224/8122	. . . . .	with energy being in the form of electromagnetic radiation	2224/81455	. . . . .	Nickel [Ni] as principal constituent
2224/81222	. . . . .	Induction heating, i.e. eddy currents	2224/81457	. . . . .	Cobalt [Co] as principal constituent
2224/81224	. . . . .	using a laser	2224/8146	. . . . .	Iron [Fe] as principal constituent
2224/8123	. . . . .	Polychromatic or infrared lamp heating	2224/81463	. . . . .	the principal constituent melting at a temperature of greater than 1550°C
2224/81232	. . . . .	using an autocatalytic reaction, e.g. exothermic brazing	2224/81464	. . . . .	Palladium [Pd] as principal constituent
2224/81234	. . . . .	using means for applying energy being within the device, e.g. integrated heater	2224/81466	. . . . .	Titanium [Ti] as principal constituent
2224/81236	. . . . .	using electro-static corona discharge	2224/81469	. . . . .	Platinum [Pt] as principal constituent
2224/81237	. . . . .	using an electron beam (electron beam welding in general B23K 15/00)	2224/8147	. . . . .	Zirconium [Zr] as principal constituent
2224/81238	. . . . .	using electric resistance welding, i.e. ohmic heating	2224/81471	. . . . .	Chromium [Cr] as principal constituent
2224/8134	. . . .	Bonding interfaces of the bump connector	2224/81472	. . . . .	Vanadium [V] as principal constituent
2224/81345	. . . .	Shape, e.g. interlocking features	2224/81473	. . . . .	Rhodium [Rh] as principal constituent
2224/81355	. . . .	having an external coating, e.g. protective bond-through coating	2224/81476	. . . . .	Ruthenium [Ru] as principal constituent
2224/81359	. . . .	Material	2224/81478	. . . . .	Iridium [Ir] as principal constituent
2224/8136	. . . .	Bonding interfaces of the semiconductor or solid state body	2224/81479	. . . . .	Niobium [Nb] as principal constituent
2224/81365	. . . .	Shape, e.g. interlocking features	2224/8148	. . . . .	Molybdenum [Mo] as principal constituent
2224/81375	. . . .	having an external coating, e.g. protective bond-through coating	2224/81481	. . . . .	Tantalum [Ta] as principal constituent
2224/81379	. . . .	Material (material of the bump connector prior to the connecting process H01L 2224/13099 and H01L 2224/13599, and subgroups)	2224/81483	. . . . .	Rhenium [Re] as principal constituent
2224/8138	. . . .	Bonding interfaces outside the semiconductor or solid-state body	2224/81484	. . . . .	Tungsten [W] as principal constituent
2224/81385	. . . .	Shape, e.g. interlocking features	2224/81486	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/81395	. . . .	having an external coating, e.g. protective bond-through coating	2224/81487	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/81488)
2224/81399	. . . .	Material	2224/81488	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/814	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/8149	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/81401	. . . . .	the principal constituent melting at a temperature of less than 400°C	2224/81491	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/81405	. . . . .	Gallium [Ga] as principal constituent	2224/81493	. . . . .	with a principal constituent of the material being a solid not provided for in groups H01L 2224/814 - H01L 2224/81491 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/81409	. . . . .	Indium [In] as principal constituent	2224/81494	. . . . .	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/814 - H01L 2224/81491
2224/81411	. . . . .	Tin [Sn] as principal constituent			
2224/81413	. . . . .	Bismuth [Bi] as principal constituent			
2224/81414	. . . . .	Thallium [Tl] as principal constituent			
2224/81416	. . . . .	Lead [Pb] as principal constituent			

2224/81495	. . . . .	with a principal constituent of the material being a gas not provided for in groups H01L 2224/814 - H01L 2224/81491	2224/8157	. . . . .	Zirconium [Zr] as principal constituent
2224/81498	. . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/81571	. . . . .	Chromium [Cr] as principal constituent
2224/81499	. . . . .	Material of the matrix	2224/81572	. . . . .	Vanadium [V] as principal constituent
2224/815	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/81573	. . . . .	Rhodium [Rh] as principal constituent
2224/81501	. . . . .	the principal constituent melting at a temperature of less than 400°C	2224/81576	. . . . .	Ruthenium [Ru] as principal constituent
2224/81505	. . . . .	Gallium [Ga] as principal constituent	2224/81578	. . . . .	Iridium [Ir] as principal constituent
2224/81509	. . . . .	Indium [In] as principal constituent	2224/81579	. . . . .	Niobium [Nb] as principal constituent
2224/81511	. . . . .	Tin [Sn] as principal constituent	2224/8158	. . . . .	Molybdenum [Mo] as principal constituent
2224/81513	. . . . .	Bismuth [Bi] as principal constituent	2224/81581	. . . . .	Tantalum [Ta] as principal constituent
2224/81514	. . . . .	Thallium [Tl] as principal constituent	2224/81583	. . . . .	Rhenium [Re] as principal constituent
2224/81516	. . . . .	Lead [Pb] as principal constituent	2224/81584	. . . . .	Tungsten [W] as principal constituent
2224/81517	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/81586	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/81518	. . . . .	Zinc [Zn] as principal constituent	2224/81587	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/81588)
2224/8152	. . . . .	Antimony [Sb] as principal constituent	2224/81588	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/81523	. . . . .	Magnesium [Mg] as principal constituent	2224/8159	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/81524	. . . . .	Aluminium [Al] as principal constituent	2224/81591	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/81538	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/81593	. . . . .	with a principal constituent of the material being a solid not provided for in groups H01L 2224/815 - H01L 2224/81591 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/81539	. . . . .	Silver [Ag] as principal constituent	2224/81594	. . . . .	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/815 - H01L 2224/81591
2224/81544	. . . . .	Gold [Au] as principal constituent	2224/81595	. . . . .	with a principal constituent of the material being a gas not provided for in groups H01L 2224/815 - H01L 2224/81591
2224/81547	. . . . .	Copper [Cu] as principal constituent	2224/81598	. . . . .	Fillers
2224/81549	. . . . .	Manganese [Mn] as principal constituent	2224/81599	. . . . .	Base material
2224/81555	. . . . .	Nickel [Ni] as principal constituent	2224/816	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/81557	. . . . .	Cobalt [Co] as principal constituent	2224/81601	. . . . .	the principal constituent melting at a temperature of less than 400°C
2224/8156	. . . . .	Iron [Fe] as principal constituent	2224/81605	. . . . .	Gallium [Ga] as principal constituent
2224/81563	. . . . .	the principal constituent melting at a temperature of greater than 1550°C			
2224/81564	. . . . .	Palladium [Pd] as principal constituent			
2224/81566	. . . . .	Titanium [Ti] as principal constituent			
2224/81569	. . . . .	Platinum [Pt] as principal constituent			

2224/81609	Indium [In] as principal constituent	2224/8168	Molybdenum [Mo] as principal constituent
2224/81611	Tin [Sn] as principal constituent	2224/81681	Tantalum [Ta] as principal constituent
2224/81613	Bismuth [Bi] as principal constituent	2224/81683	Rhenium [Re] as principal constituent
2224/81614	Thallium [Tl] as principal constituent	2224/81684	Tungsten [W] as principal constituent
2224/81616	Lead [Pb] as principal constituent	2224/81686	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/81617	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/81687	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/81688)
2224/81618	Zinc [Zn] as principal constituent	2224/81688	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/8162	Antimony [Sb] as principal constituent	2224/8169	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/81623	Magnesium [Mg] as principal constituent	2224/81691	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/81624	Aluminium [Al] as principal constituent	2224/81693	with a principal constituent of the material being a solid not provided for in groups H01L 2224/816 - H01L 2224/81691 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/81638	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/81694	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/816 - H01L 2224/81691
2224/81639	Silver [Ag] as principal constituent	2224/81695	with a principal constituent of the material being a gas not provided for in groups H01L 2224/816 - H01L 2224/81691
2224/81644	Gold [Au] as principal constituent	2224/81698	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/81647	Copper [Cu] as principal constituent	2224/81699	Coating material
2224/81649	Manganese [Mn] as principal constituent	2224/817	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/81655	Nickel [Ni] as principal constituent	2224/81701	the principal constituent melting at a temperature of less than 400°C
2224/81657	Cobalt [Co] as principal constituent	2224/81705	Gallium [Ga] as principal constituent
2224/8166	Iron [Fe] as principal constituent	2224/81709	Indium [In] as principal constituent
2224/81663	the principal constituent melting at a temperature of greater than 1550°C	2224/81711	Tin [Sn] as principal constituent
2224/81664	Palladium [Pd] as principal constituent	2224/81713	Bismuth [Bi] as principal constituent
2224/81666	Titanium [Ti] as principal constituent	2224/81714	Thallium [Tl] as principal constituent
2224/81669	Platinum [Pt] as principal constituent		
2224/8167	Zirconium [Zr] as principal constituent		
2224/81671	Chromium [Cr] as principal constituent		
2224/81672	Vanadium [V] as principal constituent		
2224/81673	Rhodium [Rh] as principal constituent		
2224/81676	Ruthenium [Ru] as principal constituent		
2224/81678	Iridium [Ir] as principal constituent		
2224/81679	Niobium [Nb] as principal constituent		

2224/81716	Lead [Pb] as principal constituent	2224/81786	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/81717	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/81787	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/81788)
2224/81718	Zinc [Zn] as principal constituent	2224/81788	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/8172	Antimony [Sb] as principal constituent	2224/8179	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/81723	Magnesium [Mg] as principal constituent	2224/81791	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/81724	Aluminium [Al] as principal constituent	2224/81793	with a principal constituent of the material being a solid not provided for in groups H01L 2224/817 - H01L 2224/81791 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/81738	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/81794	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/817 - H01L 2224/81791
2224/81739	Silver [Ag] as principal constituent	2224/81795	with a principal constituent of the material being a gas not provided for in groups H01L 2224/817 - H01L 2224/81791
2224/81744	Gold [Au] as principal constituent	2224/81798	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/81747	Copper [Cu] as principal constituent	2224/81799	Shape or distribution of the fillers
2224/81749	Manganese [Mn] as principal constituent	2224/818	Bonding techniques
2224/81755	Nickel [Ni] as principal constituent	2224/81801	Soldering or alloying
2224/81757	Cobalt [Co] as principal constituent	2224/81805	involving forming a eutectic alloy at the bonding interface
2224/8176	Iron [Fe] as principal constituent	2224/8181	involving forming an intermetallic compound at the bonding interface
2224/81763	the principal constituent melting at a temperature of greater than 1550°C	2224/81815	Reflow soldering
2224/81764	Palladium [Pd] as principal constituent	2224/8182	Diffusion bonding
2224/81766	Titanium [Ti] as principal constituent	2224/81825	Solid-liquid interdiffusion
2224/81769	Platinum [Pt] as principal constituent	2224/8183	Solid-solid interdiffusion
2224/8177	Zirconium [Zr] as principal constituent	2224/8184	Sintering
2224/81771	Chromium [Cr] as principal constituent	2224/8185	using a polymer adhesive, e.g. an adhesive based on silicone, epoxy, polyimide, polyester
2224/81772	Vanadium [V] as principal constituent	2224/81855	Hardening the adhesive by curing, i.e. thermosetting
2224/81773	Rhodium [Rh] as principal constituent	2224/81856	Pre-cured adhesive, i.e. B-stage adhesive
2224/81776	Ruthenium [Ru] as principal constituent	2224/81859	Localised curing of parts of the bump connector
2224/81778	Iridium [Ir] as principal constituent	2224/81862	Heat curing
2224/81779	Niobium [Nb] as principal constituent	2224/81865	Microwave curing
2224/8178	Molybdenum [Mo] as principal constituent	2224/81868	Infrared [IR] curing
2224/81781	Tantalum [Ta] as principal constituent	2224/81871	Visible light curing
2224/81783	Rhenium [Re] as principal constituent	2224/81874	Ultraviolet [UV] curing
2224/81784	Tungsten [W] as principal constituent		

2224/81877	Moisture curing, i.e. curing by exposing to humidity, e.g. for silicones and polyurethanes	2224/81919	Combinations of two or more cleaning methods provided for in at least two different groups from H01L 2224/8191 - H01L 2224/81914
2224/81888	Hardening the adhesive by cooling, e.g. for thermoplastics or hot-melt adhesives	2224/8192	Applying permanent coating, e.g. protective coating
2224/81885	Combinations of two or more hardening methods provided for in at least two different groups from H01L 2224/81855 - H01L 2224/8188 , e.g. for hybrid thermoplastic-thermosetting adhesives	2224/8193	Reshaping
2224/8189	using an inorganic non metallic glass type adhesive, e.g. solder glass	2224/81931	by chemical means, e.g. etching
2224/81893	Anodic bonding, i.e. bonding by applying a voltage across the interface in order to induce ions migration leading to an irreversible chemical bond	2224/81935	by heating means, e.g. reflowing
2224/81894	Direct bonding, i.e. joining surfaces by means of intermolecular attracting interactions at their interfaces, e.g. covalent bonds, van der Waals forces	2224/81937	using a polychromatic heating lamp
2224/81895	between electrically conductive surfaces, e.g. copper-copper direct bonding, surface activated bonding	2224/81939	using a laser
2224/81896	between electrically insulating surfaces, e.g. oxide or nitride layers	2224/81941	Induction heating, i.e. eddy currents
2224/81897	Mechanical interlocking, e.g. anchoring, hook and loop-type fastening or the like	2224/81943	using a flame torch, e.g. hydrogen torch
2224/81898	Press-fitting, i.e. pushing the parts together and fastening by friction, e.g. by compression of one part against the other	2224/81945	using a corona discharge, e.g. electronic flame off [EFO]
2224/81899	using resilient parts in the bump connector or in the bonding area	2224/81947	by mechanical means, e.g. "pull-and-cut", pressing, stamping
2224/819	with the bump connector not providing any mechanical bonding	2224/81948	Thermal treatments, e.g. annealing, controlled cooling
2224/81901	Pressing the bump connector against the bonding areas by means of another connector (detachable pressure contact H01L 2224/72)	2224/81951	Forming additional members, e.g. for reinforcing
2224/81902	by means of another bump connector	2224/81986	Specific sequence of steps, e.g. repetition of manufacturing steps, time sequence
2224/81903	by means of a layer connector	2224/82	by forming build-up interconnects at chip-level, e.g. for high density interconnects [HDI]
2224/81904	by means of an encapsulation layer or foil	2224/82001	involving a temporary auxiliary member not forming part of the bonding apparatus
2224/81905	Combinations of bonding methods provided for in at least two different groups from H01L 2224/818 - H01L 2224/81904	2224/82002	being a removable or sacrificial coating
2224/81906	Specific sequence of method steps	2224/82005	being a temporary or sacrificial substrate
2224/81907	Intermediate bonding, i.e. intermediate bonding step for temporarily bonding the semiconductor or solid-state body, followed by at least a further bonding step	2224/82007	involving a permanent auxiliary member being left in the finished device, e.g. aids for holding or protecting a build-up interconnect during or after the bonding process
2224/81908	involving monitoring, e.g. feedback loop	2224/82009	Pre-treatment of the connector or the bonding area
2224/81909	Post-treatment of the bump connector or bonding area	2224/8201	Cleaning, e.g. oxide removal step, desmearing
2224/8191	Cleaning, e.g. oxide removal step, desmearing	2224/8203	Reshaping, e.g. forming vias
2224/81911	Chemical cleaning, e.g. etching, flux	2224/82031	by chemical means, e.g. etching, anodisation
2224/81912	Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow	2224/82035	by heating means
2224/81913	Plasma cleaning	2224/82039	using a laser
2224/81914	Thermal cleaning, e.g. using laser ablation or by electrostatic corona discharge	2224/82045	using a corona discharge, e.g. electronic flame off [EFO]
		2224/82047	by mechanical means, e.g. severing, pressing, stamping
		2224/82048	Thermal treatments, e.g. annealing, controlled pre-heating or pre-cooling
		2224/82051	Forming additional members
		2224/82053	Bonding environment
		2224/82054	Composition of the atmosphere
		2224/82085	being a liquid, e.g. for fluidic self-assembly
		2224/8209	Vacuum
		2224/82091	Under pressure
		2224/82095	Temperature settings
		2224/82096	Transient conditions
		2224/82097	Heating
		2224/82098	Cooling
		2224/82099	Ambient temperature
		2224/821	Forming a build-up interconnect
		2224/82101	by additive methods, e.g. direct writing
		2224/82102	using jetting, e.g. ink jet
		2224/82103	using laser direct writing

2224/82104	. . . . .	using screen printing	2224/82355	. . . . .	having an external coating, e.g. protective bond-through coating
2224/82105	. . . . .	by using a preform	2224/82359	. . . . .	Material
2224/82106	. . . . .	by subtractive methods	2224/8236	. . . . .	Bonding interfaces of the semiconductor or solid state body
2224/82108	. . . . .	by self-assembly processes	2224/82365	. . . . .	Shape, e.g. interlocking features
2224/8211	. . . . .	involving protection against electrical discharge, e.g. removing electrostatic charge	2224/82375	. . . . .	having an external coating, e.g. protective bond-through coating
2224/8212	. . . . .	Aligning	2224/82379	. . . . .	Material
2224/82121	. . . . .	Active alignment, i.e. by apparatus steering, e.g. optical alignment using marks or sensors	2224/8238	. . . . .	Bonding interfaces outside the semiconductor or solid-state body
2224/82122	. . . . .	by detecting inherent features of, or outside, the semiconductor or solid-state body	2224/82385	. . . . .	Shape, e.g. interlocking features
2224/8213	. . . . .	using marks formed on the semiconductor or solid-state body	2224/82395	. . . . .	having an external coating, e.g. protective bond-through coating
2224/82132	. . . . .	using marks formed outside the semiconductor or solid-state body, i.e. "off-chip"	2224/82399	. . . . .	Material
2224/82136	. . . . .	involving guiding structures, e.g. spacers or supporting members	2224/828	. . . . .	Bonding techniques
2224/82138	. . . . .	the guiding structures being at least partially left in the finished device	2224/82801	. . . . .	Soldering or alloying
2224/82143	. . . . .	Passive alignment, i.e. self alignment, e.g. using surface energy, chemical reactions, thermal equilibrium	2224/82805	. . . . .	involving forming a eutectic alloy at the bonding interface
2224/82148	. . . . .	involving movement of a part of the bonding apparatus	2224/8281	. . . . .	involving forming an intermetallic compound at the bonding interface
2224/82149	. . . . .	being the lower part of the bonding apparatus, i.e. holding means for the bodies to be connected, e.g. XY table	2224/82815	. . . . .	Reflow soldering
2224/8215	. . . . .	Rotational movements	2224/8282	. . . . .	Diffusion bonding
2224/8216	. . . . .	Translational movements	2224/82825	. . . . .	Solid-liquid interdiffusion
2224/82169	. . . . .	being the upper part of the bonding apparatus, e.g. nozzle	2224/8283	. . . . .	Solid-solid interdiffusion
2224/8217	. . . . .	Rotational movement	2224/8284	. . . . .	Sintering
2224/8218	. . . . .	Translational movements	2224/8285	. . . . .	using a polymer adhesive, e.g. an adhesive based on silicone, epoxy, polyimide, polyester
2224/82181	. . . . .	connecting first on the semiconductor or solid-state body, i.e. on-chip,	2224/82855	. . . . .	Hardening the adhesive by curing, i.e. thermosetting
2224/82186	. . . . .	connecting first outside the semiconductor or solid-state body, i.e. off-chip	2224/82856	. . . . .	Pre-cured adhesive, i.e. B-stage adhesive
2224/82191	. . . . .	connecting first both on and outside the semiconductor or solid-state body	2224/82859	. . . . .	Localised curing of parts of the connector
2224/822	. . . . .	Applying energy for connecting	2224/82862	. . . . .	Heat curing
2224/82201	. . . . .	Compression bonding	2224/82865	. . . . .	Microwave curing
2224/82203	. . . . .	Thermocompression bonding	2224/82868	. . . . .	Infrared [IR] curing
2224/82205	. . . . .	Ultrasonic bonding	2224/82871	. . . . .	Visible light curing
2224/82207	. . . . .	Thermosonic bonding	2224/82874	. . . . .	Ultraviolet [UV] curing
2224/8221	. . . . .	with energy being in the form of electromagnetic radiation	2224/82877	. . . . .	Moisture curing, i.e. curing by exposing to humidity, e.g. for silicones and polyurethanes
2224/82212	. . . . .	Induction heating, i.e. eddy currents	2224/8288	. . . . .	Hardening the adhesive by cooling, e.g. for thermoplastics or hot-melt adhesives
2224/82214	. . . . .	using a laser	2224/82885	. . . . .	Combinations of two or more hardening methods provided for in at least two different groups from H01L 2224/82855 - H01L 2224/8288 , e.g. for hybrid thermoplastic-thermosetting adhesives
2224/8223	. . . . .	Polychromatic or infrared lamp heating	2224/8289	. . . . .	using an inorganic non metallic glass type adhesive, e.g. solder glass
2224/82232	. . . . .	using an autocatalytic reaction, e.g. exothermic brazing	2224/82893	. . . . .	Anodic bonding, i.e. bonding by applying a voltage across the interface in order to induce ions migration leading to an irreversible chemical bond
2224/82234	. . . . .	using means for applying energy being within the device, e.g. integrated heater	2224/82895	. . . . .	Direct bonding, i.e. joining surfaces by means of intermolecular attracting interactions at their interfaces, e.g. covalent bonds, van der Waals forces
2224/82236	. . . . .	using electro-static corona discharge	2224/82896	. . . . .	between electrically conductive surfaces, e.g. copper-copper direct bonding, surface activated bonding
2224/82237	. . . . .	using electron beam, (electron beam in general B23K 15/00)			
2224/82238	. . . . .	using electric resistance welding, i.e. ohmic heating			
2224/8234	. . . . .	Bonding interfaces of the connector			
2224/82345	. . . . .	Shape, e.g. interlocking features			

2224/82897	. . . . .	between electrically insulating surfaces, e.g. oxide or nitride layers	2224/83047	. . . . .	by mechanical means, e.g. severing, pressing, stamping
2224/82899	. . . . .	Combinations of bonding methods provided for in at least two different groups from H01L 2224/828 - H01L 2224/82897	2224/83048	. . . . .	Thermal treatments, e.g. annealing, controlled pre-heating or pre-cooling
2224/829	. . . . .	involving monitoring, e.g. feedback loop	2224/83051	. . . . .	Forming additional members, e.g. dam structures
2224/82909	. . . . .	Post-treatment of the connector or the bonding area	2224/83052	. . . . .	Detaching layer connectors, e.g. after testing (unsoldering in general B23K 1/018)
2224/8291	. . . . .	Cleaning, e.g. oxide removal step, desmearing	2224/83053	. . . . .	Bonding environment
2224/8293	. . . . .	Reshaping	2224/83054	. . . . .	Composition of the atmosphere
2224/82931	. . . . .	by chemical means, e.g. etching, anodisation	2224/83055	. . . . .	being oxidating
2224/82935	. . . . .	by heating means	2224/83065	. . . . .	being reducing
2224/82939	. . . . .	using a laser	2224/83075	. . . . .	being inert
2224/82945	. . . . .	using a corona discharge, e.g. electronic flame off [EFO]	2224/83085	. . . . .	being a liquid, e.g. for fluidic self-assembly
2224/82947	. . . . .	by mechanical means, e.g. severing, pressing, stamping	2224/8309	. . . . .	Vacuum
2224/82948	. . . . .	Thermal treatments, e.g. annealing, controlled pre-heating or pre-cooling	2224/83091	. . . . .	Under pressure
2224/82951	. . . . .	Forming additional members	2224/83092	. . . . .	Atmospheric pressure
2224/82986	. . . . .	Specific sequence of steps, e.g. repetition of manufacturing steps, time sequence	2224/83093	. . . . .	Transient conditions, e.g. gas-flow
2224/83	. . . . .	using a layer connector	2224/83095	. . . . .	Temperature settings
2224/83001	. . . . .	involving a temporary auxiliary member not forming part of the bonding apparatus	2224/83096	. . . . .	Transient conditions
2224/83002	. . . . .	being a removable or sacrificial coating	2224/83097	. . . . .	Heating
2224/83005	. . . . .	being a temporary or sacrificial substrate	2224/83098	. . . . .	Cooling
2224/83007	. . . . .	involving a permanent auxiliary member being left in the finished device, e.g. aids for holding or protecting the layer connector during or after the bonding process	2224/83099	. . . . .	Ambient temperature
2224/83009	. . . . .	Pre-treatment of the layer connector or the bonding area	2224/831	. . . . .	the layer connector being supplied to the parts to be connected in the bonding apparatus
2224/8301	. . . . .	Cleaning the layer connector, e.g. oxide removal step, desmearing	2224/83101	. . . . .	as prepeg comprising a layer connector, e.g. provided in an insulating plate member
2224/83011	. . . . .	Chemical cleaning, e.g. etching, flux	2224/83102	. . . . .	using surface energy, e.g. capillary forces
2224/83012	. . . . .	Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow	2224/83104	. . . . .	by applying pressure, e.g. by injection
2224/83013	. . . . .	Plasma cleaning	2224/8311	. . . . .	involving protection against electrical discharge, e.g. removing electrostatic charge
2224/83014	. . . . .	Thermal cleaning, e.g. decomposition, sublimation	2224/8312	. . . . .	Aligning
2224/83019	. . . . .	Combinations of two or more cleaning methods provided for in at least two different groups from H01L 2224/8301 - H01L 2224/83014	2224/83121	. . . . .	Active alignment, i.e. by apparatus steering, e.g. optical alignment using marks or sensors
2224/8302	. . . . .	Applying permanent coating to the layer connector in the bonding apparatus, e.g. in-situ coating	2224/83122	. . . . .	by detecting inherent features of, or outside, the semiconductor or solid-state body
2224/83022	. . . . .	Cleaning the bonding area, e.g. oxide removal step, desmearing	2224/83123	. . . . .	Shape or position of the body
2224/83024	. . . . .	Applying flux to the bonding area	2224/83125	. . . . .	Bonding areas on the body
2224/83026	. . . . .	Applying a precursor material to the bonding area	2224/83127	. . . . .	Bonding areas outside the body
2224/8303	. . . . .	Reshaping the layer connector in the bonding apparatus, e.g. flattening the layer connector	2224/83129	. . . . .	Shape or position of the other item
2224/83031	. . . . .	by chemical means, e.g. etching, anodisation	2224/8313	. . . . .	using marks formed on the semiconductor or solid-state body
2224/83035	. . . . .	by heating means	2224/83132	. . . . .	using marks formed outside the semiconductor or solid-state body, i.e. "off-chip"
2224/83037	. . . . .	using a polychromatic heating lamp	2224/83136	. . . . .	involving guiding structures, e.g. spacers or supporting members
2224/83039	. . . . .	using a laser	2224/83138	. . . . .	the guiding structures being at least partially left in the finished device
2224/83041	. . . . .	Induction heating, i.e. eddy currents	2224/83139	. . . . .	Guiding structures on the body
			2224/8314	. . . . .	Guiding structures outside the body
			2224/83141	. . . . .	Guiding structures both on and outside the body
			2224/83143	. . . . .	Passive alignment, i.e. self alignment, e.g. using surface energy, chemical reactions, thermal equilibrium
			2224/83148	. . . . .	involving movement of a part of the bonding apparatus
			2224/83149	. . . . .	being the lower part of the bonding apparatus, i.e. holding means for the bodies to be connected, e.g. XY table
			2224/8315	. . . . .	Rotational movements

2224/8316	. . . . .	Translational movements	2224/83385	. . . . .	Shape, e.g. interlocking features
2224/83169	. . . . .	being the upper part of the bonding apparatus, i.e. bonding head	2224/83395	. . . . .	having an external coating, e.g. protective bond-through coating
2224/8317	. . . . .	Rotational movements	2224/83399	. . . . .	Material
2224/8318	. . . . .	Translational movements	2224/834	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/8319	. . . . .	Arrangement of the layer connectors prior to mounting	2224/83401	. . . . .	the principal constituent melting at a temperature of less than 400°C
2224/83191	. . . . .	wherein the layer connectors are disposed only on the semiconductor or solid-state body	2224/83405	. . . . .	Gallium [Ga] as principal constituent
2224/83192	. . . . .	wherein the layer connectors are disposed only on another item or body to be connected to the semiconductor or solid-state body	2224/83409	. . . . .	Indium [In] as principal constituent
2224/83193	. . . . .	wherein the layer connectors are disposed on both the semiconductor or solid-state body and another item or body to be connected to the semiconductor or solid-state body	2224/83411	. . . . .	Tin [Sn] as principal constituent
2224/83194	. . . . .	Lateral distribution of the layer connectors	2224/83413	. . . . .	Bismuth [Bi] as principal constituent
2224/832	. . . . .	Applying energy for connecting	2224/83414	. . . . .	Thallium [Tl] as principal constituent
2224/83201	. . . . .	Compression bonding	2224/83416	. . . . .	Lead [Pb] as principal constituent
2224/83203	. . . . .	Thermocompression bonding, e.g. diffusion bonding, pressure joining, thermocompression welding or solid-state welding	2224/83417	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/83204	. . . . .	with a graded temperature profile	2224/83418	. . . . .	Zinc [Zn] as principal constituent
2224/83205	. . . . .	Ultrasonic bonding	2224/8342	. . . . .	Antimony [Sb] as principal constituent
2224/83206	. . . . .	Direction of oscillation	2224/83423	. . . . .	Magnesium [Mg] as principal constituent
2224/83207	. . . . .	Thermosonic bonding	2224/83424	. . . . .	Aluminium [Al] as principal constituent
2224/83208	. . . . .	applying unidirectional static pressure	2224/83438	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/83209	. . . . .	applying isostatic pressure, e.g. degassing using vacuum or a pressurised liquid	2224/83439	. . . . .	Silver [Ag] as principal constituent
2224/8321	. . . . .	using a reflow oven	2224/83444	. . . . .	Gold [Au] as principal constituent
2224/83211	. . . . .	with a graded temperature profile	2224/83447	. . . . .	Copper [Cu] as principal constituent
2224/8322	. . . . .	with energy being in the form of electromagnetic radiation	2224/83449	. . . . .	Manganese [Mn] as principal constituent
2224/83222	. . . . .	Induction heating, i.e. eddy currents	2224/83455	. . . . .	Nickel [Ni] as principal constituent
2224/83224	. . . . .	using a laser	2224/83457	. . . . .	Cobalt [Co] as principal constituent
2224/8323	. . . . .	Polychromatic or infrared lamp heating	2224/8346	. . . . .	Iron [Fe] as principal constituent
2224/83232	. . . . .	using an autocatalytic reaction, e.g. exothermic brazing	2224/83463	. . . . .	the principal constituent melting at a temperature of greater than 1550°C
2224/83234	. . . . .	using means for applying energy being within the device, e.g. integrated heater	2224/83464	. . . . .	Palladium [Pd] as principal constituent
2224/83236	. . . . .	using electro-static corona discharge	2224/83466	. . . . .	Titanium [Ti] as principal constituent
2224/83237	. . . . .	using an electron beam (electron beam welding in general B23K 15/00)	2224/83469	. . . . .	Platinum [Pt] as principal constituent
2224/83238	. . . . .	using electric resistance welding, i.e. ohmic heating	2224/8347	. . . . .	Zirconium [Zr] as principal constituent
2224/8334	. . . . .	Bonding interfaces of the layer connector	2224/83471	. . . . .	Chromium [Cr] as principal constituent
2224/83345	. . . . .	Shape, e.g. interlocking features	2224/83472	. . . . .	Vanadium [V] as principal constituent
2224/83355	. . . . .	having an external coating, e.g. protective bond-through coating	2224/83473	. . . . .	Rhodium [Rh] as principal constituent
2224/83359	. . . . .	Material	2224/83476	. . . . .	Ruthenium [Ru] as principal constituent
2224/8336	. . . . .	Bonding interfaces of the semiconductor or solid state body	2224/83478	. . . . .	Iridium [Ir] as principal constituent
2224/83365	. . . . .	Shape, e.g. interlocking features	2224/83479	. . . . .	Niobium [Nb] as principal constituent
2224/83375	. . . . .	having an external coating, e.g. protective bond-through coating	2224/8348	. . . . .	Molybdenum [Mo] as principal constituent
2224/83379	. . . . .	Material (material of the layer connector prior to the connecting process H01L 2224/29099 and H01L 2224/29599, and subgroups)	2224/83481	. . . . .	Tantalum [Ta] as principal constituent
2224/8338	. . . . .	Bonding interfaces outside the semiconductor or solid-state body	2224/83483	. . . . .	Rhenium [Re] as principal constituent
			2224/83484	. . . . .	Tungsten [W] as principal constituent
			2224/83486	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material

2224/83487	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/83488)	2224/83547	. . . . .	Copper [Cu] as principal constituent
2224/83488	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/83549	. . . . .	Manganese [Mn] as principal constituent
2224/8349	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/83555	. . . . .	Nickel [Ni] as principal constituent
2224/83491	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/83557	. . . . .	Cobalt [Co] as principal constituent
2224/83493	. . . . .	with a principal constituent of the material being a solid not provided for in groups H01L 2224/834 - H01L 2224/83491 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/8356	. . . . .	Iron [Fe] as principal constituent
2224/83494	. . . . .	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/834 - H01L 2224/83491	2224/83563	. . . . .	the principal constituent melting at a temperature of greater than 1550°C
2224/83495	. . . . .	with a principal constituent of the material being a gas not provided for in groups H01L 2224/834 - H01L 2224/83491	2224/83564	. . . . .	Palladium [Pd] as principal constituent
2224/83498	. . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/83566	. . . . .	Titanium [Ti] as principal constituent
2224/83499	. . . . .	Material of the matrix	2224/83569	. . . . .	Platinum [Pt] as principal constituent
2224/835	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/8357	. . . . .	Zirconium [Zr] as principal constituent
2224/83501	. . . . .	the principal constituent melting at a temperature of less than 400°C	2224/83571	. . . . .	Chromium [Cr] as principal constituent
2224/83505	. . . . .	Gallium [Ga] as principal constituent	2224/83572	. . . . .	Vanadium [V] as principal constituent
2224/83509	. . . . .	Indium [In] as principal constituent	2224/83573	. . . . .	Rhodium [Rh] as principal constituent
2224/83511	. . . . .	Tin [Sn] as principal constituent	2224/83576	. . . . .	Ruthenium [Ru] as principal constituent
2224/83513	. . . . .	Bismuth [Bi] as principal constituent	2224/83578	. . . . .	Iridium [Ir] as principal constituent
2224/83514	. . . . .	Thallium [Tl] as principal constituent	2224/83579	. . . . .	Niobium [Nb] as principal constituent
2224/83516	. . . . .	Lead [Pb] as principal constituent	2224/8358	. . . . .	Molybdenum [Mo] as principal constituent
2224/83517	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/83581	. . . . .	Tantalum [Ta] as principal constituent
2224/83518	. . . . .	Zinc [Zn] as principal constituent	2224/83583	. . . . .	Rhenium [Re] as principal constituent
2224/8352	. . . . .	Antimony [Sb] as principal constituent	2224/83584	. . . . .	Tungsten [W] as principal constituent
2224/83523	. . . . .	Magnesium [Mg] as principal constituent	2224/83586	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/83524	. . . . .	Aluminium [Al] as principal constituent	2224/83587	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/83588)
2224/83538	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/83588	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/83539	. . . . .	Silver [Ag] as principal constituent	2224/8359	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/83544	. . . . .	Gold [Au] as principal constituent	2224/83591	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
			2224/83593	. . . . .	with a principal constituent of the material being a solid not provided for in groups H01L 2224/835 - H01L 2224/83591 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond

2224/83594	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/835 - H01L 2224/83591	2224/83664	Palladium [Pd] as principal constituent
2224/83595	with a principal constituent of the material being a gas not provided for in groups H01L 2224/835 - H01L 2224/83591	2224/83666	Titanium [Ti] as principal constituent
2224/83598	Fillers	2224/83669	Platinum [Pt] as principal constituent
2224/83599	Base material	2224/8367	Zirconium [Zr] as principal constituent
2224/836	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/83671	Chromium [Cr] as principal constituent
2224/83601	the principal constituent melting at a temperature of less than 400°C	2224/83672	Vanadium [V] as principal constituent
2224/83605	Gallium [Ga] as principal constituent	2224/83673	Rhodium [Rh] as principal constituent
2224/83609	Indium [In] as principal constituent	2224/83676	Ruthenium [Ru] as principal constituent
2224/83611	Tin [Sn] as principal constituent	2224/83678	Iridium [Ir] as principal constituent
2224/83613	Bismuth [Bi] as principal constituent	2224/83679	Niobium [Nb] as principal constituent
2224/83614	Thallium [Tl] as principal constituent	2224/8368	Molybdenum [Mo] as principal constituent
2224/83616	Lead [Pb] as principal constituent	2224/83681	Tantalum [Ta] as principal constituent
2224/83617	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/83683	Rhenium [Re] as principal constituent
2224/83618	Zinc [Zn] as principal constituent	2224/83684	Tungsten [W] as principal constituent
2224/8362	Antimony [Sb] as principal constituent	2224/83686	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/83623	Magnesium [Mg] as principal constituent	2224/83687	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/83688)
2224/83624	Aluminium [Al] as principal constituent	2224/83688	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/83638	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/8369	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/83639	Silver [Ag] as principal constituent	2224/83691	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/83644	Gold [Au] as principal constituent	2224/83693	with a principal constituent of the material being a solid not provided for in groups H01L 2224/836 - H01L 2224/83691 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/83647	Copper [Cu] as principal constituent	2224/83694	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/836 - H01L 2224/83691
2224/83649	Manganese [Mn] as principal constituent	2224/83695	with a principal constituent of the material being a gas not provided for in groups H01L 2224/836 - H01L 2224/83691
2224/83655	Nickel [Ni] as principal constituent	2224/83698	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/83657	Cobalt [Co] as principal constituent	2224/83699	Coating material
2224/8366	Iron [Fe] as principal constituent		
2224/83663	the principal constituent melting at a temperature of greater than 1550°C		

2224/837	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/83772	Vanadium [V] as principal constituent
2224/83701	the principal constituent melting at a temperature of less than 400°C	2224/83773	Rhodium [Rh] as principal constituent
2224/83705	Gallium [Ga] as principal constituent	2224/83776	Ruthenium [Ru] as principal constituent
2224/83709	Indium [In] as principal constituent	2224/83778	Iridium [Ir] as principal constituent
2224/83711	Tin [Sn] as principal constituent	2224/83779	Niobium [Nb] as principal constituent
2224/83713	Bismuth [Bi] as principal constituent	2224/8378	Molybdenum [Mo] as principal constituent
2224/83714	Thallium [Tl] as principal constituent	2224/83781	Tantalum [Ta] as principal constituent
2224/83716	Lead [Pb] as principal constituent	2224/83783	Rhenium [Re] as principal constituent
2224/83717	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/83784	Tungsten [W] as principal constituent
2224/83718	Zinc [Zn] as principal constituent	2224/83786	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/8372	Antimony [Sb] as principal constituent	2224/83787	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/83788)
2224/83723	Magnesium [Mg] as principal constituent	2224/83788	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/83724	Aluminium [Al] as principal constituent	2224/8379	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/83738	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/83791	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/83739	Silver [Ag] as principal constituent	2224/83793	with a principal constituent of the material being a solid not provided for in groups H01L 2224/837 - H01L 2224/83791 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/83744	Gold [Au] as principal constituent	2224/83794	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/837 - H01L 2224/83791
2224/83747	Copper [Cu] as principal constituent	2224/83795	with a principal constituent of the material being a gas not provided for in groups H01L 2224/837 - H01L 2224/83791
2224/83749	Manganese [Mn] as principal constituent	2224/83798	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/83755	Nickel [Ni] as principal constituent	2224/83799	Shape or distribution of the fillers
2224/83757	Cobalt [Co] as principal constituent	2224/838	Bonding techniques
2224/8376	Iron [Fe] as principal constituent	2224/83801	Soldering or alloying
2224/83763	the principal constituent melting at a temperature of greater than 1550°C	2224/83805	involving forming a eutectic alloy at the bonding interface
2224/83764	Palladium [Pd] as principal constituent	2224/8381	involving forming an intermetallic compound at the bonding interface
2224/83766	Titanium [Ti] as principal constituent	2224/83815	Reflow soldering
2224/83769	Platinum [Pt] as principal constituent	2224/8382	Diffusion bonding
2224/8377	Zirconium [Zr] as principal constituent	2224/83825	Solid-liquid interdiffusion
2224/83771	Chromium [Cr] as principal constituent		

2224/8383	. . . . .	Solid-solid interdiffusion	2224/83901	. . . . .	Pressing the layer connector against the bonding areas by means of another connector
2224/8384	. . . . .	Sintering	2224/83902	. . . . .	by means of another layer connector
2224/8385	. . . . .	using a polymer adhesive, e.g. an adhesive based on silicone, epoxy, polyimide, polyester	2224/83903	. . . . .	by means of a bump connector
2224/83851	. . . . .	being an anisotropic conductive adhesive	2224/83904	. . . . .	by means of an encapsulation layer or foil
2224/83855	. . . . .	Hardening the adhesive by curing, i.e. thermosetting	2224/83905	. . . . .	Combinations of bonding methods provided for in at least two different groups from H01L 2224/838 - H01L 2224/83904
2224/83856	. . . . .	Pre-cured adhesive, i.e. B-stage adhesive	2224/83906	. . . . .	Specific sequence of method steps
2224/83859	. . . . .	Localised curing of parts of the layer connector	2224/83907	. . . . .	Intermediate bonding, i.e. intermediate bonding step for temporarily bonding the semiconductor or solid-state body, followed by at least a further bonding step
2224/83862	. . . . .	Heat curing	2224/83908	. . . . .	involving monitoring, e.g. feedback loop
2224/83865	. . . . .	Microwave curing	2224/83909	. . . . .	Post-treatment of the layer connector or bonding area
2224/83868	. . . . .	Infrared [IR] curing	2224/8391	. . . . .	Cleaning, e.g. oxide removal step, desmearing
2224/83871	. . . . .	Visible light curing	2224/83911	. . . . .	Chemical cleaning, e.g. etching, flux
2224/83874	. . . . .	Ultraviolet [UV] curing	2224/83912	. . . . .	Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow
2224/83877	. . . . .	Moisture curing, i.e. curing by exposing to humidity, e.g. for silicones and polyurethanes	2224/83913	. . . . .	Plasma cleaning
2224/8388	. . . . .	Hardening the adhesive by cooling, e.g. for thermoplastics or hot-melt adhesives	2224/83914	. . . . .	Thermal cleaning, e.g. using laser ablation or by electrostatic corona discharge
2224/83885	. . . . .	Combinations of two or more hardening methods provided for in at least two different groups from H01L 2224/83855 - H01L 2224/8388 , e.g. for hybrid thermoplastic-thermosetting adhesives	2224/83919	. . . . .	Combinations of two or more cleaning methods provided for in at least two different groups from H01L 2224/8391 - H01L 2224/83914
2224/83886	. . . . .	Involving a self-assembly process, e.g. self-agglomeration of a material dispersed in a fluid	2224/8392	. . . . .	Applying permanent coating, e.g. protective coating
2224/83887	. . . . .	Auxiliary means therefor, e.g. for self-assembly activation	2224/8393	. . . . .	Reshaping
2224/83888	. . . . .	with special adaptation of the surface of the body to be connected, e.g. surface shape specially adapted for the self-assembly process	2224/83931	. . . . .	by chemical means, e.g. etching
2224/83889	. . . . .	involving the material of the bonding area, e.g. bonding pad	2224/83935	. . . . .	by heating means, e.g. reflowing
2224/8389	. . . . .	using an inorganic non metallic glass type adhesive, e.g. solder glass	2224/83937	. . . . .	using a polychromatic heating lamp
2224/83893	. . . . .	Anodic bonding, i.e. bonding by applying a voltage across the interface in order to induce ions migration leading to an irreversible chemical bond	2224/83939	. . . . .	using a laser
2224/83894	. . . . .	Direct bonding, i.e. joining surfaces by means of intermolecular attracting interactions at their interfaces, e.g. covalent bonds, van der Waals forces	2224/83941	. . . . .	Induction heating, i.e. eddy currents
2224/83895	. . . . .	between electrically conductive surfaces, e.g. copper-copper direct bonding, surface activated bonding	2224/83943	. . . . .	using a flame torch, e.g. hydrogen torch
2224/83896	. . . . .	between electrically insulating surfaces, e.g. oxide or nitride layers	2224/83945	. . . . .	using a corona discharge, e.g. electronic flame off [EFO]
2224/83897	. . . . .	Mechanical interlocking, e.g. anchoring, hook and loop-type fastening or the like	2224/83947	. . . . .	by mechanical means, e.g. "pull-and-cut", pressing, stamping
2224/83898	. . . . .	Press-fitting, i.e. pushing the parts together and fastening by friction, e.g. by compression of one part against the other	2224/83948	. . . . .	Thermal treatments, e.g. annealing, controlled cooling
2224/83899	. . . . .	using resilient parts in the layer connector or in the bonding area	2224/83951	. . . . .	Forming additional members, e.g. for reinforcing, fillet sealant
2224/839	. . . . .	with the layer connector not providing any mechanical bonding	2224/83986	. . . . .	Specific sequence of steps, e.g. repetition of manufacturing steps, time sequence
			2224/84	. . . . .	using a strap connector
			2224/84001	. . . . .	involving a temporary auxiliary member not forming part of the bonding apparatus
			2224/84002	. . . . .	being a removable or sacrificial coating
			2224/84005	. . . . .	being a temporary substrate
			2224/84007	. . . . .	involving a permanent auxiliary member being left in the finished device, e.g. aids for holding or protecting the strap connector during or after the bonding process
			2224/84009	. . . . .	Pre-treatment of the connector and/or the bonding area
			2224/8401	. . . . .	Cleaning, e.g. oxide removal step, desmearing
			2224/84011	. . . . .	Chemical cleaning, e.g. etching, flux

2224/84012	. . . . .	Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow	2224/84138	. . . . .	the guiding structures being at least partially left in the finished device
2224/84013	. . . . .	Plasma cleaning	2224/84143	. . . . .	Passive alignment, i.e. self alignment, e.g. using surface energy, chemical reactions, thermal equilibrium
2224/84014	. . . . .	Thermal cleaning, e.g. decomposition, sublimation	2224/84148	. . . . .	involving movement of a part of the bonding apparatus
2224/84019	. . . . .	Combinations of two or more cleaning methods provided for in at least two different groups from H01L 2224/8401 - H01L 2224/84014	2224/84149	. . . . .	being the lower part of the bonding apparatus, i.e. holding means for the bodies to be connected, e.g. XY table
2224/8402	. . . . .	Applying permanent coating, e.g. in-situ coating	2224/8415	. . . . .	Rotational movements
2224/8403	. . . . .	Reshaping	2224/8416	. . . . .	Translational movements
2224/84031	. . . . .	by chemical means, e.g. etching, anodisation	2224/84169	. . . . .	being the upper part of the bonding apparatus, i.e. bonding head,
2224/84035	. . . . .	by heating means, e.g. "free-air-ball"	2224/8417	. . . . .	Rotational movements
2224/84037	. . . . .	using a polychromatic heating lamp	2224/8418	. . . . .	Translational movements
2224/84039	. . . . .	using a laser	2224/84181	. . . . .	connecting first on the semiconductor or solid-state body, i.e. on-chip, regular stitch
2224/84041	. . . . .	Induction heating, i.e. eddy currents	2224/84186	. . . . .	connecting first outside the semiconductor or solid-state body, i.e. off-chip, reverse stitch
2224/84043	. . . . .	using a flame torch, e.g. hydrogen torch	2224/84191	. . . . .	connecting first both on and outside the semiconductor or solid-state body, i.e. regular and reverse stitches
2224/84045	. . . . .	using a corona discharge, e.g. electronic flame off [EFO]	2224/84196	. . . . .	involving intermediate connecting steps before cutting the strap connector
2224/84047	. . . . .	by mechanical means, e.g. severing, pressing, stamping	2224/842	. . . . .	Applying energy for connecting
2224/84048	. . . . .	Thermal treatments, e.g. annealing, controlled pre-heating or pre-cooling	2224/84201	. . . . .	Compression bonding
2224/84051	. . . . .	Forming additional members	2224/84203	. . . . .	Thermocompression bonding
2224/84053	. . . . .	Bonding environment	2224/84205	. . . . .	Ultrasonic bonding
2224/84054	. . . . .	Composition of the atmosphere	2224/84206	. . . . .	Direction of oscillation
2224/84055	. . . . .	being oxidating	2224/84207	. . . . .	Thermosonic bonding
2224/84065	. . . . .	being reducing	2224/8421	. . . . .	with energy being in the form of electromagnetic radiation
2224/84075	. . . . .	being inert	2224/84212	. . . . .	Induction heating, i.e. eddy currents
2224/84085	. . . . .	being a liquid (e.g. for fluidic self-assembly)	2224/84214	. . . . .	using a laser
2224/8409	. . . . .	Vacuum	2224/8423	. . . . .	Polychromatic or infrared lamp heating
2224/84091	. . . . .	Under pressure	2224/84232	. . . . .	using an autocatalytic reaction, e.g. exothermic brazing
2224/84092	. . . . .	Atmospheric pressure	2224/84234	. . . . .	using means for applying energy being within the device, e.g. integrated heater
2224/84093	. . . . .	Transient conditions, e.g. gas-flow	2224/84236	. . . . .	using electro-static corona discharge
2224/84095	. . . . .	Temperature settings	2224/84237	. . . . .	using an electron beam (electron beam welding in general B23K 15/00)
2224/84096	. . . . .	Transient conditions	2224/84238	. . . . .	using electric resistance welding, i.e. ohmic heating
2224/84097	. . . . .	Heating	2224/8434	. . . . .	Bonding interfaces of the connector
2224/84098	. . . . .	Cooling	2224/84345	. . . . .	Shape, e.g. interlocking features
2224/84099	. . . . .	Ambient temperature	2224/84355	. . . . .	having an external coating, e.g. protective bond-through coating
2224/841	. . . . .	the connector being supplied to the parts to be connected in the bonding apparatus	2224/84359	. . . . .	Material
2224/8411	. . . . .	involving protection against electrical discharge, e.g. removing electrostatic charge	2224/8436	. . . . .	Bonding interfaces of the semiconductor or solid state body
2224/8412	. . . . .	Aligning	2224/84365	. . . . .	Shape, e.g. interlocking features
2224/84121	. . . . .	Active alignment, i.e. by apparatus steering, e.g. optical alignment using marks or sensors	2224/84375	. . . . .	having an external coating, e.g. protective bond-through coating
2224/84122	. . . . .	by detecting inherent features of, or outside, the semiconductor or solid-state body	2224/84379	. . . . .	Material
2224/84123	. . . . .	Shape or position of the body	2224/8438	. . . . .	Bonding interfaces outside the semiconductor or solid-state body
2224/84125	. . . . .	Bonding areas on the body	2224/84385	. . . . .	Shape, e.g. interlocking features
2224/84127	. . . . .	Bonding areas outside the body			
2224/84129	. . . . .	Shape or position of the other item			
2224/8413	. . . . .	using marks formed on the semiconductor or solid-state body			
2224/84132	. . . . .	using marks formed outside the semiconductor or solid-state body, i.e. "off-chip"			
2224/84136	. . . . .	involving guiding structures, e.g. spacers or supporting members			

2224/84395	. . . .	having an external coating, e.g. protective bond-through coating	2224/84487	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/84488)
2224/84399	. . . .	Material	2224/84488	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/844	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/8449	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/84401	. . . . .	the principal constituent melting at a temperature of less than 400°C	2224/84491	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/84405	. . . . .	Gallium [Ga] as principal constituent	2224/84493	. . . . .	with a principal constituent of the material being a solid not provided for in groups H01L 2224/844 - H01L 2224/84491 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/84409	. . . . .	Indium [In] as principal constituent	2224/84494	. . . . .	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/844 - H01L 2224/84491
2224/84411	. . . . .	Tin [Sn] as principal constituent	2224/84495	. . . . .	with a principal constituent of the material being a gas not provided for in groups H01L 2224/844 - H01L 2224/84491
2224/84413	. . . . .	Bismuth [Bi] as principal constituent	2224/84498	. . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/84414	. . . . .	Thallium [Tl] as principal constituent	2224/84499	. . . . .	Material of the matrix
2224/84416	. . . . .	Lead [Pb] as principal constituent	2224/845	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/84417	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/84501	. . . . .	the principal constituent melting at a temperature of less than 400°C
2224/84418	. . . . .	Zinc [Zn] as principal constituent	2224/84505	. . . . .	Gallium [Ga] as principal constituent
2224/8442	. . . . .	Antimony [Sb] as principal constituent	2224/84509	. . . . .	Indium [In] as principal constituent
2224/84423	. . . . .	Magnesium [Mg] as principal constituent	2224/84511	. . . . .	Tin [Sn] as principal constituent
2224/84424	. . . . .	Aluminium [Al] as principal constituent	2224/84513	. . . . .	Bismuth [Bi] as principal constituent
2224/84438	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/84514	. . . . .	Thallium [Tl] as principal constituent
2224/84439	. . . . .	Silver [Ag] as principal constituent	2224/84516	. . . . .	Lead [Pb] as principal constituent
2224/84444	. . . . .	Gold [Au] as principal constituent	2224/84517	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/84447	. . . . .	Copper [Cu] as principal constituent	2224/84518	. . . . .	Zinc [Zn] as principal constituent
2224/84449	. . . . .	Manganese [Mn] as principal constituent	2224/8452	. . . . .	Antimony [Sb] as principal constituent
2224/84455	. . . . .	Nickel [Ni] as principal constituent	2224/84523	. . . . .	Magnesium [Mg] as principal constituent
2224/84457	. . . . .	Cobalt [Co] as principal constituent	2224/84524	. . . . .	Aluminium [Al] as principal constituent
2224/8446	. . . . .	Iron [Fe] as principal constituent	2224/84538	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/84463	. . . . .	the principal constituent melting at a temperature of greater than 1550°C	2224/84539	. . . . .	Silver [Ag] as principal constituent
2224/84464	. . . . .	Palladium [Pd] as principal constituent	2224/84544	. . . . .	Gold [Au] as principal constituent
2224/84466	. . . . .	Titanium [Ti] as principal constituent			
2224/84469	. . . . .	Platinum [Pt] as principal constituent			
2224/8447	. . . . .	Zirconium [Zr] as principal constituent			
2224/84471	. . . . .	Chromium [Cr] as principal constituent			
2224/84472	. . . . .	Vanadium [V] as principal constituent			
2224/84473	. . . . .	Rhodium [Rh] as principal constituent			
2224/84476	. . . . .	Ruthenium [Ru] as principal constituent			
2224/84478	. . . . .	Iridium [Ir] as principal constituent			
2224/84479	. . . . .	Niobium [Nb] as principal constituent			
2224/8448	. . . . .	Molybdenum [Mo] as principal constituent			
2224/84481	. . . . .	Tantalum [Ta] as principal constituent			
2224/84483	. . . . .	Rhenium [Re] as principal constituent			
2224/84484	. . . . .	Tungsten [W] as principal constituent			
2224/84486	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material			

2224/84547	Copper [Cu] as principal constituent	2224/84594	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/845 - H01L 2224/84591
2224/84549	Manganese [Mn] as principal constituent	2224/84595	with a principal constituent of the material being a gas not provided for in groups H01L 2224/845 - H01L 2224/84591
2224/84555	Nickel [Ni] as principal constituent	2224/84598	Fillers
2224/84557	Cobalt [Co] as principal constituent	2224/84599	Base material
2224/8456	Iron [Fe] as principal constituent	2224/846	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/84563	the principal constituent melting at a temperature of greater than 1550°C	2224/84601	the principal constituent melting at a temperature of less than 400°C
2224/84564	Palladium [Pd] as principal constituent	2224/84605	Gallium [Ga] as principal constituent
2224/84566	Titanium [Ti] as principal constituent	2224/84609	Indium [In] as principal constituent
2224/84569	Platinum [Pt] as principal constituent	2224/84611	Tin [Sn] as principal constituent
2224/8457	Zirconium [Zr] as principal constituent	2224/84613	Bismuth [Bi] as principal constituent
2224/84571	Chromium [Cr] as principal constituent	2224/84614	Thallium [Tl] as principal constituent
2224/84572	Vanadium [V] as principal constituent	2224/84616	Lead [Pb] as principal constituent
2224/84573	Rhodium [Rh] as principal constituent	2224/84617	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/84576	Ruthenium [Ru] as principal constituent	2224/84618	Zinc [Zn] as principal constituent
2224/84578	Iridium [Ir] as principal constituent	2224/8462	Antimony [Sb] as principal constituent
2224/84579	Niobium [Nb] as principal constituent	2224/84623	Magnesium [Mg] as principal constituent
2224/8458	Molybdenum [Mo] as principal constituent	2224/84624	Aluminium [Al] as principal constituent
2224/84581	Tantalum [Ta] as principal constituent	2224/84638	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/84583	Rhenium [Re] as principal constituent	2224/84639	Silver [Ag] as principal constituent
2224/84584	Tungsten [W] as principal constituent	2224/84644	Gold [Au] as principal constituent
2224/84586	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/84647	Copper [Cu] as principal constituent
2224/84587	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/84588)	2224/84649	Manganese [Mn] as principal constituent
2224/84588	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/84655	Nickel [Ni] as principal constituent
2224/8459	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/84657	Cobalt [Co] as principal constituent
2224/84591	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/8466	Iron [Fe] as principal constituent
2224/84593	with a principal constituent of the material being a solid not provided for in groups H01L 2224/845 - H01L 2224/84591 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/84663	the principal constituent melting at a temperature of greater than 1550°C

2224/84664	Palladium [Pd] as principal constituent	2224/847	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/84666	Titanium [Ti] as principal constituent	2224/84701	the principal constituent melting at a temperature of less than 400°C
2224/84669	Platinum [Pt] as principal constituent	2224/84705	Gallium [Ga] as principal constituent
2224/8467	Zirconium [Zr] as principal constituent	2224/84709	Indium [In] as principal constituent
2224/84671	Chromium [Cr] as principal constituent	2224/84711	Tin [Sn] as principal constituent
2224/84672	Vanadium [V] as principal constituent	2224/84713	Bismuth [Bi] as principal constituent
2224/84673	Rhodium [Rh] as principal constituent	2224/84714	Thallium [Tl] as principal constituent
2224/84676	Ruthenium [Ru] as principal constituent	2224/84716	Lead [Pb] as principal constituent
2224/84678	Iridium [Ir] as principal constituent	2224/84717	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/84679	Niobium [Nb] as principal constituent	2224/84718	Zinc [Zn] as principal constituent
2224/8468	Molybdenum [Mo] as principal constituent	2224/8472	Antimony [Sb] as principal constituent
2224/84681	Tantalum [Ta] as principal constituent	2224/84723	Magnesium [Mg] as principal constituent
2224/84683	Rhenium [Re] as principal constituent	2224/84724	Aluminium [Al] as principal constituent
2224/84684	Tungsten [W] as principal constituent	2224/84738	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/84686	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/84739	Silver [Ag] as principal constituent
2224/84687	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/84688)	2224/84744	Gold [Au] as principal constituent
2224/84688	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/84747	Copper [Cu] as principal constituent
2224/8469	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/84749	Manganese [Mn] as principal constituent
2224/84691	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/84755	Nickel [Ni] as principal constituent
2224/84693	with a principal constituent of the material being a solid not provided for in groups H01L 2224/846 - H01L 2224/84691 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/84757	Cobalt [Co] as principal constituent
2224/84694	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/846 - H01L 2224/84691	2224/8476	Iron [Fe] as principal constituent
2224/84695	with a principal constituent of the material being a gas not provided for in groups H01L 2224/846 - H01L 2224/84691	2224/84763	the principal constituent melting at a temperature of greater than 1550°C
2224/84698	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/84764	Palladium [Pd] as principal constituent
2224/84699	Coating material	2224/84766	Titanium [Ti] as principal constituent
		2224/84769	Platinum [Pt] as principal constituent
		2224/8477	Zirconium [Zr] as principal constituent
		2224/84771	Chromium [Cr] as principal constituent

2224/84772	. . . . .	Vanadium [V] as principal constituent	2224/8483	. . . . .	Solid-solid interdiffusion
2224/84773	. . . . .	Rhodium [Rh] as principal constituent	2224/8484	. . . . .	Sintering
2224/84776	. . . . .	Ruthenium [Ru] as principal constituent	2224/8485	. . . . .	using a polymer adhesive, e.g. an adhesive based on silicone, epoxy, polyimide, polyester
2224/84778	. . . . .	Iridium [Ir] as principal constituent	2224/84855	. . . . .	Hardening the adhesive by curing, i.e. thermosetting
2224/84779	. . . . .	Niobium [Nb] as principal constituent	2224/84856	. . . . .	Pre-cured adhesive, i.e. B-stage adhesive
2224/8478	. . . . .	Molybdenum [Mo] as principal constituent	2224/84859	. . . . .	Localised curing of parts of the connector
2224/84781	. . . . .	Tantalum [Ta] as principal constituent	2224/84862	. . . . .	Heat curing
2224/84783	. . . . .	Rhenium [Re] as principal constituent	2224/84865	. . . . .	Microwave curing
2224/84784	. . . . .	Tungsten [W] as principal constituent	2224/84868	. . . . .	Infrared [IR] curing
2224/84786	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/84871	. . . . .	Visible light curing
2224/84787	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/84788)	2224/84874	. . . . .	Ultraviolet [UV] curing
2224/84788	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/84877	. . . . .	Moisture curing, i.e. curing by exposing to humidity, e.g. for silicones and polyurethanes
2224/8479	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/8488	. . . . .	Hardening the adhesive by cooling, e.g. for thermoplastics or hot-melt adhesives
2224/84791	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/84885	. . . . .	Combinations of two or more hardening methods provided for in at least two different groups from H01L 2224/84855 - H01L 2224/8488 , e.g. for hybrid thermoplastic-thermosetting adhesives
2224/84793	. . . . .	with a principal constituent of the material being a solid not provided for in groups H01L 2224/847 - H01L 2224/84791 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/8489	. . . . .	using an inorganic non metallic glass type adhesive, e.g. solder glass
2224/84794	. . . . .	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/847 - H01L 2224/84791	2224/84893	. . . . .	Anodic bonding, i.e. bonding by applying a voltage across the interface in order to induce ions migration leading to an irreversible chemical bond
2224/84795	. . . . .	with a principal constituent of the material being a gas not provided for in groups H01L 2224/847 - H01L 2224/84791	2224/84895	. . . . .	Direct bonding, i.e. joining surfaces by means of intermolecular attracting interactions at their interfaces, e.g. covalent bonds, van der Waals forces
2224/84798	. . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/84897	. . . . .	between electrically conductive surfaces, e.g. copper-copper direct bonding, surface activated bonding
2224/84799	. . . . .	Shape or distribution of the fillers	2224/84898	. . . . .	between electrically insulating surfaces, e.g. oxide or nitride layersg
2224/848	. . . . .	Bonding techniques	2224/84899	. . . . .	Combinations of bonding methods provided for in at least two different groups from H01L 2224/848 - H01L 2224/84898
2224/84801	. . . . .	Soldering or alloying	2224/849	. . . . .	involving monitoring, e.g. feedback loop
2224/84805	. . . . .	involving forming a eutectic alloy at the bonding interface	2224/84909	. . . . .	Post-treatment of the connector or bonding area
2224/8481	. . . . .	involving forming an intermetallic compound at the bonding interface	2224/8491	. . . . .	Cleaning, e.g. oxide removal step, desmearing
2224/84815	. . . . .	Reflow soldering	2224/84911	. . . . .	Chemical cleaning, e.g. etching, flux
2224/8482	. . . . .	Diffusion bonding	2224/84912	. . . . .	Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow
2224/84825	. . . . .	Solid-liquid interdiffusion	2224/84913	. . . . .	Plasma cleaning
			2224/84914	. . . . .	Thermal cleaning, e.g. using laser ablation or by electrostatic corona discharge
			2224/84919	. . . . .	Combinations of two or more cleaning methods provided for in at least two different groups from H01L 2224/8491 - H01L 2224/84914
			2224/8492	. . . . .	Applying permanent coating, e.g. protective coating
			2224/8493	. . . . .	Reshaping, e.g. for severing the strap, modifying the loop shape

2224/84931	. . . . .	by chemical means, e.g. etching	2224/85053	. . . . .	Bonding environment
2224/84935	. . . . .	by heating means, e.g. reflowing	2224/85054	. . . . .	Composition of the atmosphere
2224/84937	. . . . .	using a polychromatic heating lamp	2224/85055	. . . . .	being oxidating
2224/84939	. . . . .	using a laser	2224/85065	. . . . .	being reducing
2224/84941	. . . . .	Induction heating, i.e. eddy currents	2224/85075	. . . . .	being inert
2224/84943	. . . . .	using a flame torch, e.g. hydrogen torch	2224/85085	. . . . .	being a liquid, e.g. for fluidic self-assembly
2224/84945	. . . . .	using a corona discharge, e.g. electronic flame off [EFO]	2224/8509	. . . . .	Vacuum
2224/84947	. . . . .	by mechanical means, e.g. pressing, stamping	2224/85091	. . . . .	Under pressure
2224/84948	. . . . .	Thermal treatments, e.g. annealing, controlled cooling	2224/85092	. . . . .	Atmospheric pressure
2224/84951	. . . . .	Forming additional members, e.g. for reinforcing	2224/85093	. . . . .	Transient conditions, e.g. gas-flow
2224/84986	. . . . .	Specific sequence of steps, e.g. repetition of manufacturing steps, time sequence	2224/85095	. . . . .	Temperature settings
2224/85	. . . . .	using a wire connector	2224/85096	. . . . .	Transient conditions
2224/85001	. . . . .	involving a temporary auxiliary member not forming part of the bonding apparatus, e.g. removable or sacrificial coating, film or substrate	2224/85097	. . . . .	Heating
2224/85002	. . . . .	being a removable or sacrificial coating	2224/85098	. . . . .	Cooling
2224/85005	. . . . .	being a temporary or sacrificial substrate	2224/85099	. . . . .	Ambient temperature
2224/85007	. . . . .	involving a permanent auxiliary member being left in the finished device, e.g. aids for holding or protecting the wire connector during or after the bonding process	2224/851	. . . . .	the connector being supplied to the parts to be connected in the bonding apparatus
2224/85009	. . . . .	Pre-treatment of the connector or the bonding area	2224/8511	. . . . .	involving protection against electrical discharge, e.g. removing electrostatic charge
2224/8501	. . . . .	Cleaning, e.g. oxide removal step, desmearing	2224/8512	. . . . .	Aligning
2224/85011	. . . . .	Chemical cleaning, e.g. etching, flux	2224/85121	. . . . .	Active alignment, i.e. by apparatus steering, e.g. optical alignment using marks or sensors
2224/85012	. . . . .	Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow	2224/85122	. . . . .	by detecting inherent features of, or outside, the semiconductor or solid-state body
2224/85013	. . . . .	Plasma cleaning	2224/85123	. . . . .	Shape or position of the body
2224/85014	. . . . .	Thermal cleaning, e.g. decomposition, sublimation	2224/85125	. . . . .	Bonding areas on the body
2224/85016	. . . . .	using a laser	2224/85127	. . . . .	Bonding areas outside the body
2224/85017	. . . . .	Electron beam cleaning	2224/85129	. . . . .	Shape or position of the other item
2224/85019	. . . . .	Combinations of two or more cleaning methods provided for in at least two different groups from H01L 2224/8501 - H01L 2224/85014	2224/8513	. . . . .	using marks formed on the semiconductor or solid-state body
2224/8502	. . . . .	Applying permanent coating, e.g. in-situ coating	2224/85132	. . . . .	using marks formed outside the semiconductor or solid-state body, i.e. "off-chip"
2224/8503	. . . . .	Reshaping, e.g. forming the ball or the wedge of the wire connector	2224/85136	. . . . .	involving guiding structures, e.g. spacers or supporting members
2224/85031	. . . . .	by chemical means, e.g. etching, anodisation	2224/85138	. . . . .	the guiding structures being at least partially left in the finished device
2224/85035	. . . . .	by heating means, e.g. "free-air-ball"	2224/85143	. . . . .	Passive alignment, i.e. self alignment, e.g. using surface energy, chemical reactions, thermal equilibrium
2224/85037	. . . . .	using a polychromatic heating lamp	2224/85148	. . . . .	involving movement of a part of the bonding apparatus
2224/85039	. . . . .	using a laser	2224/85149	. . . . .	being the lower part of the bonding apparatus, i.e. holding means for the bodies to be connected, e.g. XY table
2224/85041	. . . . .	Induction heating, i.e. eddy currents	2224/8515	. . . . .	Rotational movements
2224/85043	. . . . .	using a flame torch, e.g. hydrogen torch	2224/8516	. . . . .	Translational movements
2224/85045	. . . . .	using a corona discharge, e.g. electronic flame off [EFO]	2224/85169	. . . . .	being the upper part of the bonding apparatus, i.e. bonding head, e.g. capillary or wedge
2224/85047	. . . . .	by mechanical means, e.g. severing, pressing, stamping	2224/8517	. . . . .	Rotational movements
2224/85048	. . . . .	Thermal treatments, e.g. annealing, controlled pre-heating or pre-cooling	2224/8518	. . . . .	Translational movements
2224/85051	. . . . .	Forming additional members, e.g. for "wedge-on-ball", "ball-on-wedge", "ball-on-ball" connections	2224/85181	. . . . .	connecting first on the semiconductor or solid-state body, i.e. on-chip, regular stitch
			2224/85186	. . . . .	connecting first outside the semiconductor or solid-state body, i.e. off-chip, reverse stitch
			2224/85191	. . . . .	connecting first both on and outside the semiconductor or solid-state body, i.e. regular and reverse stitches

2224/85196	. . . . .	involving intermediate connecting steps before cutting the wire connector	2224/85438	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/852	. . .	Applying energy for connecting	2224/85439	. . . . .	Silver (Ag) as principal constituent
2224/85201	. . . .	Compression bonding	2224/85444	. . . . .	Gold (Au) as principal constituent
2224/85203	. . . . .	Thermocompression bonding	2224/85447	. . . . .	Copper (Cu) as principal constituent
2224/85205	. . . . .	Ultrasonic bonding	2224/85449	. . . . .	Manganese (Mn) as principal constituent
2224/85206	. . . . .	Direction of oscillation	2224/85455	. . . . .	Nickel (Ni) as principal constituent
2224/85207	. . . . .	Thermosonic bonding	2224/85457	. . . . .	Cobalt (Co) as principal constituent
2224/8521	. . . .	with energy being in the form of electromagnetic radiation	2224/8546	. . . . .	Iron (Fe) as principal constituent
2224/85212	. . . . .	Induction heating, i.e. eddy currents	2224/85463	. . . . .	the principal constituent melting at a temperature of greater than 1550°C
2224/85214	. . . . .	using a laser	2224/85464	. . . . .	Palladium (Pd) as principal constituent
2224/8523	. . . . .	Polychromatic or infrared lamp heating	2224/85466	. . . . .	Titanium (Ti) as principal constituent
2224/85232	. . . .	using an autocatalytic reaction, e.g. exothermic brazing	2224/85469	. . . . .	Platinum (Pt) as principal constituent
2224/85234	. . . .	using means for applying energy being within the device, e.g. integrated heater	2224/8547	. . . . .	Zirconium (Zr) as principal constituent
2224/85236	. . . .	using electro-static corona discharge	2224/85471	. . . . .	Chromium (Cr) as principal constituent
2224/85237	. . . .	using electron beam (using electron beam in general B23K 15/00)	2224/85472	. . . . .	Vanadium (V) as principal constituent
2224/85238	. . . .	using electric resistance welding, i.e. ohmic heating	2224/85473	. . . . .	Rhodium (Rh) as principal constituent
2224/8534	. . .	Bonding interfaces of the connector	2224/85476	. . . . .	Ruthenium (Ru) as principal constituent
2224/85345	. . . .	Shape, e.g. interlocking features	2224/85478	. . . . .	Iridium (Ir) as principal constituent
2224/85355	. . . .	having an external coating, e.g. protective bond-through coating	2224/85479	. . . . .	Niobium (Nb) as principal constituent
2224/85359	. . . .	Material	2224/8548	. . . . .	Molybdenum (Mo) as principal constituent
2224/8536	. . .	Bonding interfaces of the semiconductor or solid state body	2224/85481	. . . . .	Tantalum (Ta) as principal constituent
2224/85365	. . . .	Shape, e.g. interlocking features	2224/85483	. . . . .	Rhenium (Re) as principal constituent
2224/85375	. . . .	having an external coating, e.g. protective bond-through coating	2224/85484	. . . . .	Tungsten (W) as principal constituent
2224/85379	. . . .	Material	2224/85486	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/8538	. . .	Bonding interfaces outside the semiconductor or solid-state body	2224/85487	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/85488)
2224/85385	. . . .	Shape, e.g. interlocking features	2224/85488	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/85395	. . . .	having an external coating, e.g. protective bond-through coating	2224/8549	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/85399	. . . .	Material	2224/85491	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/854	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof	2224/85493	. . . . .	with a principal constituent of the material being a solid not provided for in groups H01L 2224/854 - H01L 2224/85491 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/85401	. . . . .	the principal constituent melting at a temperature of less than 400°C	2224/85494	. . . . .	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/854 - H01L 2224/85491
2224/85405	. . . . .	Gallium (Ga) as principal constituent	2224/85495	. . . . .	with a principal constituent of the material being a gas not provided for in groups H01L 2224/854 - H01L 2224/85491
2224/85409	. . . . .	Indium (In) as principal constituent	2224/85498	. . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/85411	. . . . .	Tin (Sn) as principal constituent	2224/85499	. . . . .	Material of the matrix
2224/85413	. . . . .	Bismuth (Bi) as principal constituent			
2224/85414	. . . . .	Thallium (Tl) as principal constituent			
2224/85416	. . . . .	Lead (Pb) as principal constituent			
2224/85417	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C			
2224/85418	. . . . .	Zinc (Zn) as principal constituent			
2224/8542	. . . . .	Antimony (Sb) as principal constituent			
2224/85423	. . . . .	Magnesium (Mg) as principal constituent			
2224/85424	. . . . .	Aluminium (Al) as principal constituent			

2224/855	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof	2224/85578	Iridium (Ir) as principal constituent
2224/85501	the principal constituent melting at a temperature of less than 400°C	2224/85579	Niobium (Nb) as principal constituent
2224/85505	Gallium (Ga) as principal constituent	2224/8558	Molybdenum (Mo) as principal constituent
2224/85509	Indium (In) as principal constituent	2224/85581	Tantalum (Ta) as principal constituent
2224/85511	Tin (Sn) as principal constituent	2224/85583	Rhenium (Re) as principal constituent
2224/85513	Bismuth (Bi) as principal constituent	2224/85584	Tungsten (W) as principal constituent
2224/85514	Thallium (Tl) as principal constituent	2224/85586	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/85516	Lead (Pb) as principal constituent	2224/85587	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/85588)
2224/85517	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/85588	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/85518	Zinc (Zn) as principal constituent	2224/8559	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/8552	Antimony (Sb) as principal constituent	2224/85591	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/85523	Magnesium (Mg) as principal constituent	2224/85593	with a principal constituent of the material being a solid not provided for in groups H01L 2224/855 - H01L 2224/85591 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/85524	Aluminium (Al) as principal constituent	2224/85594	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/855 - H01L 2224/85591
2224/85538	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/85595	with a principal constituent of the material being a gas not provided for in groups H01L 2224/855 - H01L 2224/85591
2224/85539	Silver (Ag) as principal constituent	2224/85598	Fillers
2224/85544	Gold (Au) as principal constituent	2224/85599	Base material
2224/85547	Copper (Cu) as principal constituent	2224/856	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
2224/85549	Manganese (Mn) as principal constituent	2224/85601	the principal constituent melting at a temperature of less than 400°C
2224/85555	Nickel (Ni) as principal constituent	2224/85605	Gallium (Ga) as principal constituent
2224/85557	Cobalt (Co) as principal constituent	2224/85609	Indium (In) as principal constituent
2224/8556	Iron (Fe) as principal constituent	2224/85611	Tin (Sn) as principal constituent
2224/85563	the principal constituent melting at a temperature of greater than 1550°C	2224/85613	Bismuth (Bi) as principal constituent
2224/85564	Palladium (Pd) as principal constituent	2224/85614	Thallium (Tl) as principal constituent
2224/85566	Titanium (Ti) as principal constituent	2224/85616	Lead (Pb) as principal constituent
2224/85569	Platinum (Pt) as principal constituent		
2224/8557	Zirconium (Zr) as principal constituent		
2224/85571	Chromium (Cr) as principal constituent		
2224/85572	Vanadium (V) as principal constituent		
2224/85573	Rhodium (Rh) as principal constituent		
2224/85576	Ruthenium (Ru) as principal constituent		

2224/85617	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/85687	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/85688)
2224/85618	Zinc (Zn) as principal constituent	2224/85688	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/8562	Antimony (Sb) as principal constituent	2224/8569	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/85623	Magnesium (Mg) as principal constituent	2224/85691	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/85624	Aluminium (Al) as principal constituent	2224/85693	with a principal constituent of the material being a solid not provided for in groups H01L 2224/856 - H01L 2224/85691 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/85638	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/85694	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/856 - H01L 2224/85691
2224/85639	Silver (Ag) as principal constituent	2224/85695	with a principal constituent of the material being a gas not provided for in groups H01L 2224/856 - H01L 2224/85691
2224/85644	Gold (Au) as principal constituent	2224/85698	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/85647	Copper (Cu) as principal constituent	2224/85699	Coating material
2224/85649	Manganese (Mn) as principal constituent	2224/857	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
2224/85655	Nickel (Ni) as principal constituent	2224/85701	the principal constituent melting at a temperature of less than 400°C
2224/85657	Cobalt (Co) as principal constituent	2224/85705	Gallium (Ga) as principal constituent
2224/8566	Iron (Fe) as principal constituent	2224/85709	Indium (In) as principal constituent
2224/85663	the principal constituent melting at a temperature of greater than 1550°C	2224/85711	Tin (Sn) as principal constituent
2224/85664	Palladium (Pd) as principal constituent	2224/85713	Bismuth (Bi) as principal constituent
2224/85666	Titanium (Ti) as principal constituent	2224/85714	Thallium (Tl) as principal constituent
2224/85669	Platinum (Pt) as principal constituent	2224/85716	Lead (Pb) as principal constituent
2224/8567	Zirconium (Zr) as principal constituent	2224/85717	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/85671	Chromium (Cr) as principal constituent	2224/85718	Zinc (Zn) as principal constituent
2224/85672	Vanadium (V) as principal constituent	2224/8572	Antimony (Sb) as principal constituent
2224/85673	Rhodium (Rh) as principal constituent	2224/85723	Magnesium (Mg) as principal constituent
2224/85676	Ruthenium (Ru) as principal constituent		
2224/85678	Iridium (Ir) as principal constituent		
2224/85679	Niobium (Nb) as principal constituent		
2224/8568	Molybdenum (Mo) as principal constituent		
2224/85681	Tantalum (Ta) as principal constituent		
2224/85683	Rhenium (Re) as principal constituent		
2224/85684	Tungsten (W) as principal constituent		
2224/85686	with a principal constituent of the material being a non metallic, non metalloid inorganic material		

2224/85724	Aluminium (Al) as principal constituent	2224/85791	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/85738	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/85793	with a principal constituent of the material being a solid not provided for in groups H01L 2224/857 - H01L 2224/85791 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/85739	Silver (Ag) as principal constituent	2224/85794	with a principal constituent of the material being a liquid not provided for in groups H01L 2224/857 - H01L 2224/85791
2224/85744	Gold (Au) as principal constituent	2224/85795	with a principal constituent of the material being a gas not provided for in groups H01L 2224/857 - H01L 2224/85791
2224/85747	Copper (Cu) as principal constituent	2224/85798	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/85749	Manganese (Mn) as principal constituent	2224/85799	Shape or distribution of the fillers
2224/85755	Nickel (Ni) as principal constituent	2224/858	Bonding techniques
2224/85757	Cobalt (Co) as principal constituent	2224/85801	Soldering or alloying
2224/8576	Iron (Fe) as principal constituent	2224/85805	involving forming a eutectic alloy at the bonding interface
2224/85763	the principal constituent melting at a temperature of greater than 1550°C	2224/8581	involving forming an intermetallic compound at the bonding interface
2224/85764	Palladium (Pd) as principal constituent	2224/85815	Reflow soldering
2224/85766	Titanium (Ti) as principal constituent	2224/8582	Diffusion bonding
2224/85769	Platinum (Pt) as principal constituent	2224/85825	Solid-liquid interdiffusion
2224/8577	Zirconium (Zr) as principal constituent	2224/8583	Solid-solid interdiffusion, e.g. "direct bonding"
2224/85771	Chromium (Cr) as principal constituent	2224/8584	Sintering
2224/85772	Vanadium (V) as principal constituent	2224/8585	using a polymer adhesive, e.g. an adhesive based on silicone, epoxy, polyimide, polyester
2224/85773	Rhodium (Rh) as principal constituent	2224/85855	Hardening the adhesive by curing, i.e. thermosetting
2224/85776	Ruthenium (Ru) as principal constituent	2224/85856	Pre-cured adhesive, i.e. B-stage adhesive
2224/85778	Iridium (Ir) as principal constituent	2224/85859	Localised curing of parts of the connector
2224/85779	Niobium (Nb) as principal constituent	2224/85862	Heat curing
2224/8578	Molybdenum (Mo) as principal constituent	2224/85865	Microwave curing
2224/85781	Tantalum (Ta) as principal constituent	2224/85868	Infrared [IR] curing
2224/85783	Rhenium (Re) as principal constituent	2224/85871	Visible light curing
2224/85784	Tungsten (W) as principal constituent	2224/85874	Ultraviolet [UV] curing
2224/85786	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/85877	Moisture curing, i.e. curing by exposing to humidity, e.g. for silicones and polyurethanes
2224/85787	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2224/85788)	2224/8588	Hardening the adhesive by cooling, e.g. for thermoplastics or hot-melt adhesives
2224/85788	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/85885	Combinations of two or more hardening methods provided for in at least two different groups from H01L 2224/85855 - H01L 2224/85888 , e.g. for hybrid thermoplastic-thermosetting adhesives
2224/8579	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/8589	using an inorganic non metallic glass type adhesive, e.g. solder glass

- 2224/85893 Anodic bonding, i.e. bonding by applying a voltage across the interface in order to induce ions migration leading to an irreversible chemical bond
- 2224/85895 Direct bonding, i.e. joining surfaces by means of intermolecular attracting interactions at their interfaces, e.g. covalent bonds, van der Waals forces
- 2224/85897 between electrically conductive surfaces, e.g. copper-copper direct bonding, surface activated bonding
- 2224/85898 between electrically insulating surfaces, e.g. oxide or nitride layers
- 2224/85899 Combinations of bonding methods provided for in at least two different groups from [H01L 2224/858](#) - [H01L 2224/85898](#)
- 2224/859 involving monitoring, e.g. feedback loop
- 2224/85909 Post-treatment of the connector or wire bonding area
- 2224/8591 Cleaning, e.g. oxide removal step, desmearing
- 2224/85911 Chemical cleaning, e.g. etching, flux
- 2224/85912 Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow
- 2224/85913 Plasma cleaning
- 2224/85914 Thermal cleaning, e.g. using laser ablation or by electrostatic corona discharge
- 2224/85916 using a laser
- 2224/85917 Electron beam cleaning
- 2224/85919 Combinations of two or more cleaning methods provided for in at least two different groups from [H01L 2224/8591](#) - [H01L 2224/85914](#)
- 2224/8592 Applying permanent coating, e.g. protective coating
- 2224/8593 Reshaping, e.g. for severing the wire, modifying the wedge or ball or the loop shape
- 2224/85931 by chemical means, e.g. etching
- 2224/85935 by heating means, e.g. reflowing
- 2224/85937 using a polychromatic heating lamp
- 2224/85939 using a laser
- 2224/85941 Induction heating, i.e. eddy currents
- 2224/85943 using a flame torch, e.g. hydrogen torch
- 2224/85945 using a corona discharge, e.g. electronic flame off [EFO]
- 2224/85947 by mechanical means, e.g. "pull-and-cut", pressing, stamping
- 2224/85948 Thermal treatments, e.g. annealing, controlled cooling
- 2224/85951 Forming additional members, e.g. for reinforcing
- 2224/85986 Specific sequence of steps, e.g. repetition of manufacturing steps, time sequence
- 2224/86 using tape automated bonding [TAB]
- 2224/86001 involving a temporary auxiliary member not forming part of the bonding apparatus
- 2224/86002 being a removable or sacrificial coating
- 2224/86005 being a temporary or sacrificial substrate
- 2224/86007 involving a permanent auxiliary member being left in the finished device, e.g. aids for holding or protecting the TAB connector during or after the bonding process
- 2224/86009 Pre-treatment of the connector or the bonding area
- 2224/8601 Cleaning, e.g. oxide removal step, desmearing
- 2224/8603 Reshaping
- 2224/86031 by chemical means, e.g. etching, anodisation
- 2224/86035 by heating
- 2224/86039 using a laser
- 2224/86045 using a corona discharge, e.g. electronic flame off [EFO]
- 2224/86047 by mechanical means, e.g. severing, pressing, stamping
- 2224/86048 Thermal treatment, e.g. annealing, controlled pre-heating or pre-cooling
- 2224/86051 Forming additional members
- 2224/86053 Bonding environment
- 2224/86054 Composition of the atmosphere
- 2224/86085 being a liquid, e.g. fluidic self-assembly
- 2224/8609 Vacuum
- 2224/86091 Under pressure
- 2224/86095 Temperature settings
- 2224/86096 Transient conditions
- 2224/86097 Heating
- 2224/86098 Cooling
- 2224/86099 Ambient temperature
- 2224/861 the connector being supplied to the parts to be connected in the bonding apparatus
- 2224/8611 involving protection against electrical discharge, e.g. removing electrostatic charge
- 2224/8612 Aligning
- 2224/86121 Active alignment, i.e. by apparatus steering, e.g. optical alignment using marks or sensors
- 2224/86122 by detecting inherent features of, or outside, the semiconductor or solid-state body
- 2224/8613 using marks formed on the semiconductor or solid-state body
- 2224/86132 using marks formed outside the semiconductor or solid-state body, i.e. "off-chip"
- 2224/86136 involving guiding structures, e.g. spacers or supporting members
- 2224/86138 the guiding structures being at least partially left in the finished device
- 2224/86143 Passive alignment, i.e. self alignment, e.g. using surface energy, chemical reactions, thermal equilibrium
- 2224/86148 involving movement of a part of the bonding apparatus
- 2224/86149 being the lower part of the bonding apparatus, i.e. holding means for the bodies to be connected, e.g. XY table
- 2224/8615 Rotational movements
- 2224/8616 Translational movements
- 2224/86169 being the upper part of the bonding apparatus, e.g. nozzle
- 2224/8617 Rotational movement
- 2224/8618 Translational movements
- 2224/86181 connecting first on the semiconductor or solid-state body, i.e. on-chip,

- 2224/86186 connecting first outside the semiconductor or solid-state body, i.e. off-chip
- 2224/86191 connecting first both on and outside the semiconductor or solid-state body
- 2224/862 Applying energy for connecting
- 2224/86201 Compression bonding
- 2224/86203 Thermo-compression bonding
- 2224/86205 Ultrasonic bonding
- 2224/86207 Thermosonic bonding
- 2224/8621 with energy being in the form of electromagnetic radiation
- 2224/86212 Induction heating, i.e. eddy currents
- 2224/86214 using a laser
- 2224/8623 Polychromatic or infrared lamp heating
- 2224/86232 using an autocatalytic reaction, e.g. exothermic brazing
- 2224/86234 using means for applying energy being within the device, e.g. integrated heater
- 2224/86236 using electro-static corona discharge
- 2224/86237 using electron beam ([electron beam in general B23K 15/00](#))
- 2224/86238 using electric resistance welding, i.e. ohmic heating
- 2224/8634 Bonding interfaces of the connector
- 2224/86345 Shape, e.g. interlocking features
- 2224/86355 having an external coating, e.g. protective bond-through coating
- 2224/86359 Material
- 2224/8636 Bonding interfaces of the semiconductor or solid state body
- 2224/86365 Shape, e.g. interlocking features
- 2224/86375 having an external coating, e.g. protective bond-through coating
- 2224/86379 Material
- 2224/8638 Bonding interfaces outside the semiconductor or solid-state body
- 2224/86385 Shape, e.g. interlocking features
- 2224/86395 having an external coating, e.g. protective bond-through coating
- 2224/86399 Material
- 2224/868 Bonding techniques
- 2224/86801 Soldering or alloying
- 2224/86805 involving forming a eutectic alloy at the bonding interface
- 2224/8681 involving forming an intermetallic compound at the bonding interface
- 2224/86815 Reflow soldering
- 2224/8682 Diffusion bonding
- 2224/86825 Solid-liquid interdiffusion
- 2224/8683 Solid-solid interdiffusion
- 2224/8684 Sintering
- 2224/8685 using a polymer adhesive, e.g. an adhesive based on silicone, epoxy, polyimide, polyester
- 2224/86855 Hardening the adhesive by curing, i.e. thermosetting
- 2224/86856 Pre-cured adhesive, i.e. B-stage adhesive
- 2224/86859 Localised curing of parts of the connector
- 2224/86862 Heat curing
- 2224/86865 Microwave curing
- 2224/86868 Infrared [IR] curing
- 2224/86871 Visible light curing
- 2224/86874 Ultraviolet [UV] curing
- 2224/86877 Moisture curing, i.e. curing by exposing to humidity, e.g. for silicones and polyurethanes
- 2224/8688 Hardening the adhesive by cooling, e.g. for thermoplastics or hot-melt adhesives
- 2224/86885 Combinations of two or more hardening methods provided for in at least two different groups selected from [H01L 2224/86855](#) - [H01L 2224/8688](#), e.g. hybrid thermoplastic-thermosetting adhesives
- 2224/8689 using an inorganic non metallic glass type adhesive, e.g. solder glass
- 2224/86893 Anodic bonding, i.e. bonding by applying a voltage across the interface in order to induce ions migration leading to an irreversible chemical bond
- 2224/86895 Direct bonding, i.e. joining surfaces by means of intermolecular attracting interactions at their interfaces, e.g. covalent bonds, van der Waals forces
- 2224/86896 between electrically conductive surfaces, e.g. copper-copper direct bonding, surface activated bonding
- 2224/86897 between electrically insulating surfaces, e.g. oxide or nitride layers
- 2224/86899 Combinations of bonding methods provided for in at least two different groups from [H01L 2224/868](#) - [H01L 2224/86897](#)
- 2224/869 involving monitoring, e.g. feedback loop
- 2224/86909 Post-treatment of the connector or the bonding area
- 2224/8691 Cleaning, e.g. oxide removal step, desmearing
- 2224/8693 Reshaping
- 2224/86931 by chemical means, e.g. etching, anodisation
- 2224/86935 by heating means
- 2224/86939 using a laser
- 2224/86945 using a corona discharge, e.g. electronic flame off [EFO]
- 2224/86947 by mechanical means, e.g. severing, pressing, stamping
- 2224/86948 Thermal treatments, e.g. annealing, controlled pre-heating or pre-cooling
- 2224/86951 Forming additional members
- 2224/86986 Specific sequence of steps, e.g. repetition of manufacturing steps, time sequence
- 2224/89 using at least one connector not provided for in any of the groups [H01L 2224/81](#) - [H01L 2224/86](#)
- 2224/90 Methods for connecting semiconductor or solid state bodies using means for bonding not being attached to, or not being formed on, the body surface to be connected, e.g. pressure contacts using springs or clips
- 2224/91 Methods for connecting semiconductor or solid state bodies including different methods provided for in two or more of groups [H01L 2224/80](#) - [H01L 2224/90](#)
- 2224/92 Specific sequence of method steps

2224/9201	. . .	Forming connectors during the connecting process, e.g. in-situ formation of bumps	2224/92172	. . . . .	the first connecting process involving a TAB connector
2224/9202	. . .	Forming additional connectors after the connecting process	2224/92173	. . . . .	the second connecting process involving a bump connector
2224/9205	. . .	Intermediate bonding steps, i.e. partial connection of the semiconductor or solid-state body during the connecting process	2224/92174	. . . . .	the second connecting process involving a build-up interconnect
2224/921	. . .	Connecting a surface with connectors of different types	2224/92175	. . . . .	the second connecting process involving a layer connector
2224/9211	. . . .	Parallel connecting processes	2224/92176	. . . . .	the second connecting process involving a strap connector
2224/9212	. . . .	Sequential connecting processes	2224/92177	. . . . .	the second connecting process involving a wire connector
2224/92122	. . . . .	the first connecting process involving a bump connector	2224/922	. . .	Connecting different surfaces of the semiconductor or solid-state body with connectors of different types
2224/92124	. . . . .	the second connecting process involving a build-up interconnect	2224/9221	. . . .	Parallel connecting processes
2224/92125	. . . . .	the second connecting process involving a layer connector	2224/9222	. . . .	Sequential connecting processes
2224/92127	. . . . .	the second connecting process involving a wire connector	2224/92222	. . . . .	the first connecting process involving a bump connector
2224/92132	. . . . .	the first connecting process involving a build-up interconnect	2224/92224	. . . . .	the second connecting process involving a build-up interconnect
2224/92133	. . . . .	the second connecting process involving a bump connector	2224/92225	. . . . .	the second connecting process involving a layer connector
2224/92135	. . . . .	the second connecting process involving a layer connector	2224/92226	. . . . .	the second connecting process involving a strap connector
2224/92136	. . . . .	the second connecting process involving a strap connector	2224/92227	. . . . .	the second connecting process involving a wire connector
2224/92137	. . . . .	the second connecting process involving a wire connector	2224/92228	. . . . .	the second connecting process involving a TAB connector
2224/92138	. . . . .	the second connecting process involving a TAB connector	2224/92242	. . . . .	the first connecting process involving a layer connector
2224/92142	. . . . .	the first connecting process involving a layer connector	2224/92244	. . . . .	the second connecting process involving a build-up interconnect
2224/92143	. . . . .	the second connecting process involving a bump connector	2224/92246	. . . . .	the second connecting process involving a strap connector
2224/92144	. . . . .	the second connecting process involving a build-up interconnect	2224/92247	. . . . .	the second connecting process involving a wire connector
2224/92147	. . . . .	the second connecting process involving a wire connector	2224/92248	. . . . .	the second connecting process involving a TAB connector
2224/92148	. . . . .	the second connecting process involving a TAB connector	2224/92252	. . . . .	the first connecting process involving a strap connector
2224/92152	. . . . .	the first connecting process involving a strap connector	2224/92253	. . . . .	the second connecting process involving a bump connector
2224/92153	. . . . .	the second connecting process involving a bump connector	2224/92255	. . . . .	the second connecting process involving a layer connector
2224/92155	. . . . .	the second connecting process involving a layer connector	2224/93	. . .	Batch processes
2224/92157	. . . . .	the second connecting process involving a wire connector	2224/94	. . .	at wafer-level, i.e. with connecting carried out on a wafer comprising a plurality of undiced individual devices
2224/92158	. . . . .	the second connecting process involving a TAB connector	2224/95	. . .	at chip-level, i.e. with connecting carried out on a plurality of singulated devices, i.e. on diced chips
2224/92162	. . . . .	the first connecting process involving a wire connector	2224/95001	. . .	involving a temporary auxiliary member not forming part of the bonding apparatus, e.g. removable or sacrificial coating, film or substrate
2224/92163	. . . . .	the second connecting process involving a bump connector	2224/95053	. . .	Bonding environment
2224/92164	. . . . .	the second connecting process involving a build-up interconnect	2224/95085	. . . .	being a liquid, e.g. for fluidic self-assembly
2224/92165	. . . . .	the second connecting process involving a layer connector	2224/95091	. . . .	Under pressure
2224/92166	. . . . .	the second connecting process involving a strap connector	2224/95092	. . . . .	Atmospheric pressure, e.g. dry self-assembly
2224/92168	. . . . .	the second connecting process involving a TAB connector	2224/95093	. . . . .	Transient conditions, e.g. assisted by a gas flow or a liquid flow
			2224/951	. . .	Supplying the plurality of semiconductor or solid-state bodies

- 2224/95101 in a liquid medium
- 2224/95102 being a colloidal droplet
- 2224/95111 using a rack or rail
- 2224/95115 using a roll-to-roll transfer technique
- 2224/95112 . . . Aligning the plurality of semiconductor or solid-state bodies
- 2224/95121 Active alignment, i.e. by apparatus steering
- 2224/95122 by applying vibration
- 2224/95123 by applying a pressurised fluid flow, e.g. liquid or gas flow
- 2224/95133 by applying an electromagnetic field
- 2224/95134 Electrowetting, i.e. by changing the surface energy of a droplet
- 2224/95136 involving guiding structures, e.g. shape matching, spacers or supporting members
- 2224/95143 Passive alignment, i.e. self alignment, e.g. using surface energy, chemical reactions, thermal equilibrium
- 2224/95144 Magnetic alignment, i.e. using permanent magnetic parts in the semiconductor or solid-state body
- 2224/95145 Electrostatic alignment, i.e. polarity alignment with Coulomb charges
- 2224/95146 by surface tension
- 2224/95147 by molecular lock-key, e.g. by DNA
- 2224/95148 involving movement of a part of the bonding apparatus
- 2224/96 . . . the devices being encapsulated in a common layer, e.g. neo-wafer or pseudo-wafer, said common layer being separable into individual assemblies after connecting
- 2224/97 . . . the devices being connected to a common substrate, e.g. interposer, said common substrate being separable into individual assemblies after connecting
- 2224/98 . . . Methods for disconnecting semiconductor or solid-state bodies
- 2225/00** **Details relating to assemblies covered by the group [H01L 25/00](#) but not provided for in its subgroups**
- 2225/03 . . . All the devices being of a type provided for in the same subgroup of groups [H01L 27/00](#) - [H01L 51/00](#)
- 2225/04 . . . the devices not having separate containers
- 2225/065 . . . the devices being of a type provided for in group [H01L 27/00](#)
- 2225/06503 Stacked arrangements of devices
- 2225/06506 Wire or wire-like electrical connections between devices
- 2225/0651 Wire or wire-like electrical connections from device to substrate
- 2225/06513 Bump or bump-like direct electrical connections between devices, e.g. flip-chip connection, solder bumps
- 2225/06517 Bump or bump-like direct electrical connections from device to substrate
- 2225/0652 Bump or bump-like direct electrical connections from substrate to substrate
- 2225/06524 Electrical connections formed on device or on substrate, e.g. a deposited or grown layer
- 2225/06527 Special adaptation of electrical connections, e.g. rewiring, engineering changes, pressure contacts, layout
- 2225/06531 Non-galvanic coupling, e.g. capacitive coupling
- 2225/06534 Optical coupling
- 2225/06537 Electromagnetic shielding
- 2225/06541 Conductive via connections through the device, e.g. vertical interconnects, through silicon via [TSV] ([manufacturing via connections per se H01L 21/76898](#))
- 2225/06544 Design considerations for via connections, e.g. geometry or layout
- 2225/06548 Conductive via connections through the substrate, container, or encapsulation
- 2225/06551 Conductive connections on the side of the device
- 2225/06555 Geometry of the stack, e.g. form of the devices, geometry to facilitate stacking
- 2225/06558 the devices having passive surfaces facing each other, i.e. in a back-to-back arrangement
- 2225/06562 at least one device in the stack being rotated or offset
- 2225/06565 the devices having the same size and there being no auxiliary carrier between the devices
- 2225/06568 the devices decreasing in size, e.g. pyramidal stack
- 2225/06572 Auxiliary carrier between devices, the carrier having an electrical connection structure
- 2225/06575 Auxiliary carrier between devices, the carrier having no electrical connection structure
- 2225/06579 TAB carriers; beam leads
- 2225/06582 Housing for the assembly, e.g. chip scale package [CSP]
- 2225/06586 Housing with external bump or bump-like connectors
- 2225/06589 Thermal management, e.g. cooling
- 2225/06593 Mounting aids permanently on device; arrangements for alignment ([use of temporary supports H01L 21/6835](#))
- 2225/06596 Structural arrangements for testing ([testing or measuring during manufacture or treatment H01L 22/00](#); [testing electrical properties or locating electrical faults G01R 31/00](#))
- 2225/10 . . . the devices having separate containers
- 2225/1005 . . . the devices being of a type provided for in group [H01L 27/00](#)
- 2225/1011 the containers being in a stacked arrangement
- 2225/1017 the lowermost container comprising a device support
- 2225/1023 the support being an insulating substrate
- 2225/1029 the support being a lead frame
- 2225/1035 the device being entirely enclosed by the support, e.g. high-density interconnect [HDI]
- 2225/1041 Special adaptations for top connections of the lowermost container, e.g. redistribution layer, integral interposer
- 2225/1047 Details of electrical connections between containers
- 2225/1052 Wire or wire-like electrical connections

2225/1058	. . . . . Bump or bump-like electrical connections, e.g. balls, pillars, posts	2251/554	. . . Oxidation-reduction potential
2225/1064	. . . . . Electrical connections provided on a side surface of one or more of the containers	2251/556	. . . Temperature
2225/107	. . . . . Indirect electrical connections, e.g. via an interposer, a flexible substrate, using TAB (printed circuits H05K 1/00)	2251/558	. . . Thickness
2225/1076	. . . . . Shape of the containers	2251/56	. . Processes specially adapted for the manufacture or treatment of OLED
2225/1082	. . . . . for improving alignment between containers, e.g. interlocking features	2251/562	. . . Aging
2225/1088	. . . . . Arrangements to limit the height of the assembly	2251/564	. . . Application of alternating current
2225/1094	. . . . . Thermal management, e.g. cooling	2251/566	. . . Division of substrate, e.g. for manufacturing of OLED displays
2225/1094	. . . . . Thermal management, e.g. cooling	2251/568	. . . Repairing
2227/00	Indexing scheme for devices consisting of a plurality of semiconductor or other solid state components formed in or on a common substrate covered by group H01L 27/00	2924/00	Indexing scheme for arrangements or methods for connecting or disconnecting semiconductor or solid-state bodies as covered by H01L 24/00
2227/32	. Devices including an organic light emitting device [OLED], e.g. OLED display	2924/0001	. Technical content checked by a classifier
2227/323	. . Multistep processes for AMOLED		NOTE
2227/326	. . Use of temporary substrate, e.g. for manufacturing of OLED displays having an inorganic driving circuit		Codes H01L 2924/0001 - H01L 2924/0002 are used to describe the status of reclassification; they do not relate to technical features as such
2229/00	Indexing scheme for semiconductor devices adapted for rectifying, amplifying, oscillating or switching, or capacitors or resistors with at least one potential-jump barrier or surface barrier, for details of semiconductor bodies or of electrodes thereof, or for multistep manufacturing processes therefor	2924/00011	. . Not relevant to the scope of the group, the symbol of which is combined with the symbol of this group
2251/00	Indexing scheme relating to organic semiconductor devices covered by group H01L 51/00	2924/00012	. . Relevant to the scope of the group, the symbol of which is combined with the symbol of this group
2251/10	. Processes specially adapted for the manufacture or treatment of organic semiconductor devices	2924/00013	. . Fully indexed content
2251/105	. . Patterning of a layer by embossing, e.g. to form trenches in an insulating layer	2924/00014	. . the subject-matter covered by the group, the symbol of which is combined with the symbol of this group, being disclosed without further technical details
2251/30	. Materials	2924/00015	. . the subject-matter covered by the group, the symbol of which is combined with the symbol of this group, being disclosed as prior art
2251/301	. . Inorganic materials	2924/0002	. . Not covered by any one of groups H01L 24/00 , H01L 24/00 and H01L 2224/00
2251/303	. . . Oxides, e.g. metal oxides	2924/01	. Chemical elements
2251/305	. . . . Transparent conductive oxides [TCO]	2924/01001	. . Hydrogen [H]
2251/306	. . . . . composed of tin oxides, e.g. F doped SnO ₂	2924/01002	. . Helium [He]
2251/308	. . . . . composed of indium oxides, e.g. ITO	2924/01003	. . Lithium [Li]
2251/50	. Organic light emitting devices	2924/01004	. . Beryllium [Be]
2251/53	. . Structure	2924/01005	. . Boron [B]
2251/5307	. . . specially adapted for controlling the direction of light emission	2924/01006	. . Carbon [C]
2251/5315	. . . . Top emission	2924/01007	. . Nitrogen [N]
2251/5323	. . . . Two-side emission, i.e. TOLED	2924/01008	. . Oxygen [O]
2251/533	. . . . End-face emission	2924/01009	. . Fluorine [F]
2251/5338	. . . . Flexible OLED	2924/0101	. . Neon [Ne]
2251/5346	. . . . Graded composition	2924/01011	. . Sodium [Na]
2251/5353	. . . . Inverted OLED	2924/01012	. . Magnesium [Mg]
2251/5361	. . . . OLED lamp	2924/01013	. . Aluminum [Al]
2251/5369	. . . . Nanoparticles used in whatever layer except emissive layer, e.g. in packaging	2924/01014	. . Silicon [Si]
2251/5376	. . . . Combination of fluorescent and phosphorescent emission	2924/01015	. . Phosphorus [P]
2251/5384	. . . . Multiple hosts in the emissive layer	2924/01016	. . Sulfur [S]
2251/5392	. . . . Short-circuit prevention	2924/01017	. . Chlorine [Cl]
2251/55	. . characterised by parameters	2924/01018	. . Argon [Ar]
2251/552	. . . HOMO-LUMO-EF	2924/01019	. . Potassium [K]
		2924/0102	. . Calcium [Ca]
		2924/01021	. . Scandium [Sc]
		2924/01022	. . Titanium [Ti]
		2924/01023	. . Vanadium [V]
		2924/01024	. . Chromium [Cr]
		2924/01025	. . Manganese [Mn]
		2924/01026	. . Iron [Fe]
		2924/01027	. . Cobalt [Co]

2924/01028	. . Nickel [Ni]	2924/01089	. . Actinium [Ac]
2924/01029	. . Copper [Cu]	2924/0109	. . Thorium [Th]
2924/0103	. . Zinc [Zn]	2924/01091	. . Protactinium [Pa]
2924/01031	. . Gallium [Ga]	2924/01092	. . Uranium [U]
2924/01032	. . Germanium [Ge]	2924/01093	. . Neptunium [Np]
2924/01033	. . Arsenic [As]	2924/01094	. . Plutonium [Pu]
2924/01034	. . Selenium [Se]	2924/011	. Groups of the periodic table
2924/01035	. . Bromine [Br]	2924/01101	. . Alkali metals
2924/01036	. . Krypton [Kr]	2924/01102	. . Alkali earth metals
2924/01037	. . Rubidium [Rb]	2924/01103	. . Transition metals
2924/01038	. . Strontium [Sr]	2924/01104	. . Refractory metals
2924/01039	. . Yttrium [Y]	2924/01105	. . Rare earth metals
2924/0104	. . Zirconium [Zr]	2924/01106	. . . Lanthanides, i.e. Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
2924/01041	. . Niobium [Nb]	2924/01107	. . . Actinides, i.e. Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No, Lr
2924/01042	. . Molybdenum [Mo]	2924/01108	. . Noble metals
2924/01043	. . Technetium [Tc]	2924/01109	. . Metalloids or Semi-metals
2924/01044	. . Ruthenium [Ru]	2924/0111	. . Chalcogens
2924/01045	. . Rhodium [Rh]	2924/01111	. . Halogens
2924/01046	. . Palladium [Pd]	2924/01112	. . Noble gases
2924/01047	. . Silver [Ag]	2924/012	. Semiconductor purity grades
2924/01048	. . Cadmium [Cd]	2924/01201	. . 1N purity grades, i.e. 90%
2924/01049	. . Indium [In]	2924/01202	. . 2N purity grades, i.e. 99%
2924/0105	. . Tin [Sn]	2924/01203	. . 3N purity grades, i.e. 99.9%
2924/01051	. . Antimony [Sb]	2924/01204	. . 4N purity grades, i.e. 99.99%
2924/01052	. . Tellurium [Te]	2924/01205	. . 5N purity grades, i.e. 99.999%
2924/01053	. . Iodine [I]	2924/01206	. . 6N purity grades, i.e. 99.9999%
2924/01054	. . Xenon [Xe]	2924/01207	. . 7N purity grades, i.e. 99.99999%
2924/01055	. . Cesium [Cs]	2924/01208	. . 8N purity grades, i.e. 99.999999%
2924/01056	. . Barium [Ba]	2924/013	. Alloys
2924/01057	. . Lanthanum [La]	2924/0132	. . Binary Alloys
2924/01058	. . Cerium [Ce]	2924/01321	. . . Isomorphous Alloys
2924/01059	. . Praseodymium [Pr]	2924/01322	. . . Eutectic Alloys, i.e. obtained by a liquid transforming into two solid phases
2924/0106	. . Neodymium [Nd]	2924/01323	. . . . Hypoeutectic alloys i.e. with compositions lying to the left of the eutectic point
2924/01061	. . Promethium [Pm]	2924/01324	. . . . Hypereutectic alloys i.e. with compositions lying to the right of the eutectic point
2924/01062	. . Samarium [Sm]	2924/01325	. . . Peritectic Alloys, i.e. obtained by a liquid and a solid transforming into a new and different solid phase
2924/01063	. . Europium [Eu]	2924/01326	. . . Monotectics, i.e. obtained by a liquid transforming into a solid and a new and different liquid phase
2924/01064	. . Gadolinium [Gd]	2924/01327	. . . Intermediate phases, i.e. intermetallics compounds
2924/01065	. . Terbium [Tb]	2924/0133	. . Ternary Alloys
2924/01066	. . Dysprosium [Dy]	2924/0134	. . Quaternary Alloys
2924/01067	. . Holmium [Ho]	2924/0135	. . Quinary Alloys
2924/01068	. . Erbium [Er]	2924/014	. Solder alloys
2924/01069	. . Thulium [Tm]	2924/01402	. . Invar, i.e. single-phase alloy of around 36% nickel and 64% iron
2924/0107	. . Ytterbium [Yb]	2924/01403	. . Kovar, i.e. FeNiCo alloys
2924/01071	. . Lutetium [Lu]	2924/01404	. . Alloy 42, i.e. FeNi42
2924/01072	. . Hafnium [Hf]	2924/01405	. . Inovco, i.e. Fe-33Ni-4.5Co
2924/01073	. . Tantalum [Ta]	2924/042	. Borides composed of metals from groups of the periodic table
2924/01074	. . Tungsten [W]	2924/0421	. . 1st Group
2924/01075	. . Rhenium [Re]	2924/0422	. . 2nd Group
2924/01076	. . Osmium [Os]	2924/0423	. . 3rd Group
2924/01077	. . Iridium [Ir]	2924/0424	. . 4th Group
2924/01078	. . Platinum [Pt]		
2924/01079	. . Gold [Au]		
2924/0108	. . Mercury [Hg]		
2924/01081	. . Thallium [Tl]		
2924/01082	. . Lead [Pb]		
2924/01083	. . Bismuth [Bi]		
2924/01084	. . Polonium [Po]		
2924/01085	. . Astatine [At]		
2924/01086	. . Radon [Rn]		
2924/01087	. . Francium [Fr]		
2924/01088	. . Radium [Ra]		

2924/0425	. . 5th Group	2924/0486	. . Actinides
2924/0426	. . 6th Group	2924/0489	. . being a combination of two or more materials provided in the groups H01L 2924/0471 - H01L 2924/0486
2924/0427	. . 7th Group	2924/04891	. . having a monocrystalline microstructure
2924/0428	. . 8th Group	2924/04892	. . having a polycrystalline microstructure
2924/0429	. . 9th Group	2924/04894	. . having an amorphous microstructure, i.e. glass
2924/044	. . 10th Group	2924/049	. Nitrides composed of metals from groups of the periodic table
2924/0441	. . 11th Group	2924/0491	. . 1st Group
2924/0442	. . 12th Group	2924/0492	. . 2nd Group
2924/0443	. . 13th Group	2924/0493	. . 3rd Group
2924/0444	. . 14th Group	2924/0494	. . 4th Group
2924/0445	. . Lanthanides	2924/04941	. . . TiN
2924/0446	. . Actinides	2924/0495	. . 5th Group
2924/0449	. . being a combination of two or more materials provided in the groups H01L 2924/0421 - H01L 2924/0446	2924/04953	. . . TaN
2924/04491	. . having a monocrystalline microstructure	2924/0496	. . 6th Group
2924/04492	. . having a polycrystalline microstructure	2924/0497	. . 7th Group
2924/04494	. . having an amorphous microstructure, i.e. glass	2924/0498	. . 8th Group
2924/045	. Carbides composed of metals from groups of the periodic table	2924/0499	. . 9th Group
2924/0451	. . 1st Group	2924/05	. . 10th Group
2924/0452	. . 2nd Group	2924/0501	. . 11th Group
2924/0453	. . 3rd Group	2924/0502	. . 12th Group
2924/0454	. . 4th Group	2924/0503	. . 13th Group
2924/04541	. . . TiC	2924/05032	. . . AlN
2924/0455	. . 5th Group	2924/0504	. . 14th Group
2924/0456	. . 6th Group	2924/05042	. . . Si ₃ N ₄
2924/04563	. . . WC	2924/0505	. . Lanthanides
2924/0457	. . 7th Group	2924/0506	. . Actinides
2924/0458	. . 8th Group	2924/0509	. . being a combination of two or more materials provided in the groups H01L 2924/0491 - H01L 2924/0506
2924/0459	. . 9th Group	2924/05091	. . having a monocrystalline microstructure
2924/046	. . 10th Group	2924/05092	. . having a polycrystalline microstructure
2924/0461	. . 11th Group	2924/05094	. . having an amorphous microstructure, i.e. glass
2924/0462	. . 12th Group	2924/051	. Phosphides composed of metals from groups of the periodic table
2924/0463	. . 13th Group	2924/0511	. . 1st Group
2924/0464	. . 14th Group	2924/0512	. . 2nd Group
2924/04642	. . . SiC	2924/0513	. . 3rd Group
2924/0465	. . Lanthanides	2924/0514	. . 4th Group
2924/0466	. . Actinides	2924/0515	. . 5th Group
2924/0469	. . being a combination of two or more materials provided in the groups H01L 2924/0451 - H01L 2924/0466	2924/0516	. . 6th Group
2924/04691	. . having a monocrystalline microstructure	2924/0517	. . 7th Group
2924/04692	. . having a polycrystalline microstructure	2924/0518	. . 8th Group
2924/04694	. . having an amorphous microstructure, i.e. glass	2924/0519	. . 9th Group
2924/047	. Silicides composed of metals from groups of the periodic table	2924/052	. . 10th Group
2924/0471	. . 1st Group	2924/0521	. . 11th Group
2924/0472	. . 2nd Group	2924/0522	. . 12th Group
2924/0473	. . 3rd Group	2924/0523	. . 13th Group
2924/0474	. . 4th Group	2924/0524	. . 14th Group
2924/0475	. . 5th Group	2924/0525	. . Lanthanides
2924/0476	. . 6th Group	2924/0526	. . Actinides
2924/0477	. . 7th Group	2924/0529	. . being a combination of two or more materials provided in the groups H01L 2924/0511 - H01L 2924/0526
2924/0478	. . 8th Group	2924/05291	. . having a monocrystalline microstructure
2924/0479	. . 9th Group	2924/05292	. . having a polycrystalline microstructure
2924/048	. . 10th Group	2924/05294	. . having an amorphous microstructure, i.e. glass
2924/0481	. . 11th Group	2924/053	. Oxides composed of metals from groups of the periodic table
2924/0482	. . 12th Group	2924/0531	. . 1st Group
2924/0483	. . 13th Group		
2924/0484	. . 14th Group		
2924/0485	. . Lanthanides		

2924/0532	. . 2nd Group	2924/058	. . 10th Group
2924/0533	. . 3rd Group	2924/0581	. . 11th Group
2924/0534	. . 4th Group	2924/0582	. . 12th Group
2924/05341	. . . TiO ₂	2924/0583	. . 13th Group
2924/05342	. . . ZrO ₂	2924/0584	. . 14th Group
2924/0535	. . 5th Group	2924/0585	. . Lanthanides
2924/0536	. . 6th Group	2924/0586	. . Actinides
2924/0537	. . 7th Group	2924/0589	. . being a combination of two or more materials provided in the groups H01L 2924/0571 - H01L 2924/0586
2924/0538	. . 8th Group		
2924/05381	. . . FeOx	2924/05891	. . having a monocrystalline microstructure
2924/0539	. . 9th Group	2924/05892	. . having a polycrystalline microstructure
2924/054	. . 10th Group	2924/05894	. . having an amorphous microstructure, i.e. glass
2924/0541	. . 11th Group	2924/059	. Being combinations of any of the materials from the groups H01L 2924/042 - H01L 2924/0584 , e.g. oxynitrides
2924/0542	. . 12th Group		
2924/0543	. . 13th Group	2924/05991	. . having a monocrystalline microstructure
2924/05432	. . . Al ₂ O ₃	2924/05992	. . having a polycrystalline microstructure
2924/0544	. . 14th Group	2924/05994	. . having an amorphous microstructure, i.e. glass
2924/05442	. . . SiO ₂	2924/06	. Polymers (polymers per se C08 ; polymer adhesives C09J)
2924/0545	. . Lanthanides		
2924/0546	. . Actinides	2924/061	. . Polyolefin polymer
2924/0549	. . being a combination of two or more materials provided in the groups H01L 2924/0531 - H01L 2924/0546	2924/0615	. . Styrenic polymer
		2924/062	. . Halogenated polymer
2924/05491	. . having a monocrystalline microstructure	2924/0625	. . Polyvinyl alcohol
2924/05492	. . having a polycrystalline microstructure	2924/063	. . Polyvinyl acetate
2924/05494	. . having an amorphous microstructure, i.e. glass	2924/0635	. . Acrylic polymer
2924/055	. Chalcogenides other than oxygen i.e. sulfides, selenides and tellurides composed of metals from groups of the periodic table	2924/064	. . Graft polymer
		2924/0645	. . Block copolymer
2924/0551	. . 1st Group	2924/065	. . ABS
2924/0552	. . 2nd Group	2924/0655	. . Polyacetal
2924/0553	. . 3rd Group	2924/066	. . Phenolic resin
2924/0554	. . 4th Group	2924/0665	. . Epoxy resin
2924/0555	. . 5th Group	2924/067	. . Polyphenylene
2924/0556	. . 6th Group	2924/0675	. . Polyester
2924/0557	. . 7th Group	2924/068	. . Polycarbonate
2924/0558	. . 8th Group	2924/0685	. . Polyether
2924/0559	. . 9th Group	2924/069	. . Polyurethane
2924/056	. . 10th Group	2924/0695	. . Polyamide
2924/0561	. . 11th Group	2924/07	. . Polyamine or polyimide
2924/0562	. . 12th Group	2924/07001	. . . Polyamine
2924/0563	. . 13th Group	2924/07025	. . . Polyimide
2924/0564	. . 14th Group	2924/0705	. . Sulfur containing polymer
2924/0565	. . Lanthanides	2924/0715	. . Polysiloxane
2924/0566	. . Actinides	2924/078	. . Adhesive characteristics other than chemical
2924/0569	. . being a combination of two or more materials provided in the groups H01L 2924/0551 - H01L 2924/0566	2924/07802	. . . not being an ohmic electrical conductor
		2924/0781	. . . being an ohmic electrical conductor
2924/05691	. . having a monocrystalline microstructure	2924/07811	. . . . Extrinsic, i.e. with electrical conductive fillers
2924/05692	. . having a polycrystalline microstructure		
2924/05694	. . having an amorphous microstructure, i.e. glass	2924/07812	. . . . Intrinsic, e.g. polyaniline [PANI]
2924/057	. Halides composed of metals from groups of the periodic table	2924/0782	. . . being pressure sensitive
		2924/095	. with a principal constituent of the material being a combination of two or more materials provided in the groups H01L 2924/013 - H01L 2924/0715
2924/0571	. . 1st Group		
2924/0572	. . 2nd Group	2924/0951	. . Glass epoxy laminates
2924/0573	. . 3rd Group	2924/09511	. . . FR-4
2924/0574	. . 4th Group	2924/09512	. . . FR-5
2924/0575	. . 5th Group	2924/09522	. . . G10
2924/0576	. . 6th Group	2924/09523	. . . G11
2924/0577	. . 7th Group	2924/096	. . Cermets, i.e. composite material composed of ceramic and metallic materials
2924/0578	. . 8th Group		
2924/0579	. . 9th Group	2924/097	. . Glass-ceramics, e.g. devitrified glass

2924/09701	. . . Low temperature co-fired ceramic [LTCC]	2924/10353	. . . . . Indium arsenide antimonide phosphide [InAsSbP]
2924/10	. Details of semiconductor or other solid state devices to be connected	2924/10354	. . . . . Aluminium indium arsenide phosphide [AlInAsP]
2924/1011	. . Structure	2924/10355	. . . . . Aluminium gallium arsenide nitride [AlGaAsN]
2924/1015	. . Shape	2924/10356	. . . . . Indium gallium arsenide nitride [InGaAsN]
2924/10155	. . . being other than a cuboid	2924/10357	. . . . . Indium aluminium arsenide nitride [InAlAsN]
2924/10156	. . . . at the periphery	2924/10358	. . . . . Gallium arsenide antimonide nitride [GaAsSbN]
2924/10157	. . . . at the active surface	2924/10359	. . . . . Gallium indium nitride arsenide antimonide [GaInNAsSb]
2924/10158	. . . . at the passive surface	2924/1036	. . . . . Gallium indium arsenide antimonide phosphide [GaInAsSbP]
2924/1016	. . . being a cuboid	2924/1037	. . . . . II-VI
2924/10161	. . . . with a rectangular active surface	2924/10371	. . . . . Cadmium selenide [CdSe]
2924/10162	. . . . with a square active surface	2924/10372	. . . . . Cadmium sulfide [CdS]
2924/1017	. . . being a sphere	2924/10373	. . . . . Cadmium telluride [CdTe]
2924/102	. . Material of the semiconductor or solid state bodies	2924/10375	. . . . . Zinc selenide [ZnSe]
2924/1025	. . . Semiconducting materials	2924/10376	. . . . . Zinc sulfide [ZnS]
2924/10251	. . . . Elemental semiconductors, i.e. Group IV	2924/10377	. . . . . Zinc telluride [ZnTe]
2924/10252	. . . . . Germanium [Ge]	2924/10378	. . . . . Cadmium zinc telluride, i.e. CZT [CdZnTe]
2924/10253	. . . . . Silicon [Si]	2924/10379	. . . . . Mercury cadmium telluride [HgZnTe]
2924/10254	. . . . . Diamond [C]	2924/1038	. . . . . Mercury zinc telluride [HgZnSe]
2924/1026	. . . . Compound semiconductors	2924/10381	. . . . . Mercury zinc selenide [HgZnSe]
2924/1027	. . . . . IV	2924/1042	. . . . . I-VII
2924/10271	. . . . . Silicon-germanium [SiGe]	2924/10421	. . . . . Cuprous chloride [CuCl]
2924/10272	. . . . . Silicon Carbide [SiC]	2924/1047	. . . . . I-VI
2924/1032	. . . . . III-V	2924/10471	. . . . . Copper sulfide [CuS]
2924/10321	. . . . . Aluminium antimonide [AlSb]	2924/1052	. . . . . IV-VI
2924/10322	. . . . . Aluminium arsenide [AlAs]	2924/10521	. . . . . Lead selenide [PbSe]
2924/10323	. . . . . Aluminium nitride [AlN]	2924/10522	. . . . . Lead(II)sulfide [PbS]
2924/10324	. . . . . Aluminium phosphide [AlP]	2924/10523	. . . . . Lead telluride [PbTe]
2924/10325	. . . . . Boron nitride [BN], e.g. cubic, hexagonal, nanotube	2924/10524	. . . . . Tin sulfide [SnS, SnS ₂]
2924/10326	. . . . . Boron phosphide [BP]	2924/10525	. . . . . Tin telluride [SnTe]
2924/10327	. . . . . Boron arsenide [BAs, B ₁₂ As ₂]	2924/10526	. . . . . Lead tin telluride [PbSnTe]
2924/10328	. . . . . Gallium antimonide [GaSb]	2924/10527	. . . . . Thallium tin telluride [Tl ₂ SnTe ₅]
2924/10329	. . . . . Gallium arsenide [GaAs]	2924/10528	. . . . . Thallium germanium telluride [Tl ₂ GeTe ₅]
2924/1033	. . . . . Gallium nitride [GaN]	2924/1057	. . . . . V-VI
2924/10331	. . . . . Gallium phosphide [GaP]	2924/10571	. . . . . Bismuth telluride [Bi ₂ Te ₃]
2924/10332	. . . . . Indium antimonide [InSb]	2924/1062	. . . . . II-V
2924/10333	. . . . . Indium arsenide [InAs]	2924/10621	. . . . . Cadmium phosphide [Cd ₃ P ₂]
2924/10334	. . . . . Indium nitride [InN]	2924/10622	. . . . . Cadmium arsenide [Cd ₃ As ₂]
2924/10335	. . . . . Indium phosphide [InP]	2924/10623	. . . . . Cadmium antimonide [Cd ₃ Sb ₂]
2924/10336	. . . . . Aluminium gallium arsenide [AlGaAs]	2924/10624	. . . . . Zinc phosphide [Zn ₃ P ₂]
2924/10337	. . . . . Indium gallium arsenide [InGaAs]	2924/10625	. . . . . Zinc arsenide [Zn ₃ As ₂]
2924/10338	. . . . . Indium gallium phosphide [InGaP]	2924/10626	. . . . . Zinc antimonide [Zn ₃ Sb ₂]
2924/10339	. . . . . Aluminium indium arsenide [AlInAs]	2924/1067	. . . . . Oxide
2924/1034	. . . . . Aluminium indium antimonide [AlInSb]	2924/10671	. . . . . Titanium dioxide, anatase, rutile, brookite [TiO ₂]
2924/10341	. . . . . Gallium arsenide nitride [GaAsN]	2924/10672	. . . . . Copper(I)oxide [Cu ₂ O]
2924/10342	. . . . . Gallium arsenide phosphide [GaAsP]	2924/10673	. . . . . Copper(II)oxide [CuO]
2924/10343	. . . . . Gallium arsenide antimonide [GaAsSb]	2924/10674	. . . . . Uranium dioxide [UO ₂]
2924/10344	. . . . . Aluminium gallium nitride [AlGaN]	2924/10675	. . . . . Uranium trioxide [UO ₃]
2924/10345	. . . . . Aluminium gallium phosphide [AlGaP]	2924/10676	. . . . . Bismuth trioxide [Bi ₂ O ₃]
2924/10346	. . . . . Indium gallium nitride [InGaN]	2924/10677	. . . . . Tin dioxide [SnO ₂]
2924/10347	. . . . . Indium arsenide antimonide [InAsSb]	2924/10678	. . . . . Barium titanate [BaTiO ₃]
2924/10348	. . . . . Indium gallium antimonide [InGaSb]	2924/10679	. . . . . Strontium titanate [SrTiO ₃]
2924/10349	. . . . . Aluminium gallium indium phosphide [AlGaInP]		
2924/1035	. . . . . Aluminium gallium arsenide phosphide [AlGaInP]		
2924/10351	. . . . . Indium gallium arsenide phosphide [InGaAsP]		
2924/10352	. . . . . Indium gallium arsenide antimonide [InGaAsSb]		

2924/1068	. . . . .	Lithium niobate [LiNbO ₃]	2924/13016	. . . . .	Dynistor - Unidirectional switching device
2924/10681	. . . . .	Lanthanum copper oxide [La ₂ CuO ₄]	2924/13017	. . . . .	Shockley diode - Unidirectional trigger and switching device
2924/1072	. . . . .	Layered	2924/13018	. . . . .	SIDAC - Bidirectional switching device
2924/10721	. . . . .	Lead(II)iodide [PbI ₂]	2924/13019	. . . . .	Trisil, SIDACTor - Bidirectional protection devices
2924/10722	. . . . .	Molybdenum disulfide [MoS ₂]	2924/1302	. . . . .	GTO - Gate Turn-Off thyristor
2924/10723	. . . . .	Gallium selenide [GaSe]	2924/13021	. . . . .	DB-GTO - Distributed Buffer Gate Turn-Off thyristor
2924/10724	. . . . .	Tin sulfide [SnS]	2924/13022	. . . . .	MA-GTO - Modified Anode Gate Turn-Off thyristor
2924/10725	. . . . .	Bismuth sulfide [Bi ₂ S ₃]	2924/13023	. . . . .	IGCT - Integrated Gate Commutated Thyristor
2924/1077	. . . . .	Magnetic diluted [DMS]	2924/13024	. . . . .	LASCR - Light Activated SCR, or LTT - Light triggered thyristor
2924/10771	. . . . .	Gallium manganese arsenide [GaMnAs]	2924/13025	. . . . .	Light Activated Semiconducting Switch [LASS]
2924/10772	. . . . .	Indium manganese arsenide [InMnAs]	2924/13026	. . . . .	MCT - MOSFET Controlled Thyristor - It contains two additional FET structures for on/off control
2924/10773	. . . . .	Cadmium manganese telluride [CdMnTe]	2924/13027	. . . . .	BRT - Base Resistance Controlled Thyristor
2924/10774	. . . . .	Lead manganese telluride [PbMnTe]	2924/13028	. . . . .	RCT - Reverse Conducting Thyristor
2924/10775	. . . . .	Lanthanum calcium manganate [La _{0.7} Ca _{0.3} MnO ₃]	2924/13029	. . . . .	PUT or PUJT - Programmable Unijunction Transistor - A thyristor with gate on n-type layer near to the anode used as a functional replacement for unijunction transistor
2924/10776	. . . . .	Iron(II)oxide [FeO]	2924/1303	. . . . .	SCS - Silicon Controlled Switch or Thyristor Tetrode - A thyristor with both cathode and anode gates
2924/10777	. . . . .	Nickel(II)oxide [NiO]	2924/13032	. . . . .	SITh - Static Induction Thyristor, or FCTh - Field Controlled Thyristor - containing a gate structure that can shut down anode current flow
2924/10778	. . . . .	Europium(II)oxide [EuO]	2924/13033	. . . . .	TRIAC - Triode for Alternating Current - A bidirectional switching device containing two thyristor structures with common gate contact
2924/10779	. . . . .	Europium(II)sulfide [EuS]	2924/13034	. . . . .	Silicon Controlled Rectifier [SCR]
2924/1078	. . . . .	Chromium(III)bromide [CrBr ₃]	2924/13035	. . . . .	Asymmetrical SCR [ASCR]
2924/1082	. . . . .	Other	2924/1304	. . . . .	Transistor
2924/10821	. . . . .	Copper indium gallium selenide, CIGS [Cu[In,Ga]Se ₂]	2924/1305	. . . . .	Bipolar Junction Transistor [BJT]
2924/10822	. . . . .	Copper zinc tin sulfide, CZTS [Cu ₂ ZnSnS ₄]	2924/13051	. . . . .	Heterojunction bipolar transistor [HBT]
2924/10823	. . . . .	Copper indium selenide, CIS [CuInSe ₂]	2924/13052	. . . . .	Schottky transistor
2924/10824	. . . . .	Silver gallium sulfide [AgGaS ₂]	2924/13053	. . . . .	Avalanche transistor
2924/10825	. . . . .	Zinc silicon phosphide [ZnSiP ₂]	2924/13054	. . . . .	Darlington transistor
2924/10826	. . . . .	Arsenic selenide [As ₂ S ₃]	2924/13055	. . . . .	Insulated gate bipolar transistor [IGBT]
2924/10827	. . . . .	Platinum silicide [PtSi]	2924/13056	. . . . .	Photo transistor
2924/10828	. . . . .	Bismuth(III)iodide [BiI ₃]	2924/1306	. . . . .	Field-effect transistor [FET]
2924/10829	. . . . .	Mercury(II)iodide [HgI ₂]	2924/13061	. . . . .	Carbon nanotube field-effect transistor [CNFET]
2924/1083	. . . . .	Thallium(I)bromide [TlBr]	2924/13062	. . . . .	Junction field-effect transistor [JFET]
2924/10831	. . . . .	Selenium [Se]	2924/13063	. . . . .	Metal-Semiconductor Field-Effect Transistor [MESFET]
2924/10832	. . . . .	Silver sulfide [Ag ₂ S]	2924/13064	. . . . .	High Electron Mobility Transistor [HEMT, HFET [heterostructure FET], MODFET]
2924/10833	. . . . .	Iron disulfide [FeS ₂]	2924/13066	. . . . .	Inverted-T field effect transistor [ITFET]
2924/11	. .	Device type	2924/13067	. . . . .	FinFET, source/drain region shapes fins on the silicon surface
2924/12	. . .	Passive devices, e.g. 2 terminal devices	2924/13068	. . . . .	Fast-reverse epitaxial diode field-effect transistor [FREDFET]
2924/1203	. . . .	Rectifying Diode	2924/13069	. . . . .	Thin film transistor [TFT]
2924/12031	. . . . .	PIN diode			
2924/12032	. . . . .	Schottky diode			
2924/12033	. . . . .	Gunn diode			
2924/12034	. . . . .	Varactor			
2924/12035	. . . . .	Zener diode			
2924/12036	. . . . .	PN diode			
2924/12037	. . . . .	Cat's whisker diode			
2924/12038	. . . . .	Point contact			
2924/1204	. . . .	Optical Diode			
2924/12041	. . . . .	LED			
2924/12042	. . . . .	LASER			
2924/12043	. . . . .	Photo diode			
2924/12044	. . . . .	OLED			
2924/1205	. . . .	Capacitor			
2924/1206	. . . .	Inductor			
2924/1207	. . . .	Resistor			
2924/13	. . .	Discrete devices, e.g. 3 terminal devices			
2924/1301	. . . .	Thyristor			
2924/13011	. . . . .	Anode Gate Thyristor [AGT]			
2924/13013	. . . . .	Bidirectional Control Thyristor [BCT]			
2924/13014	. . . . .	Breakover Diode [BOD]			
2924/13015	. . . . .	DIAC - Bidirectional trigger device			

2924/1307	. . . . . Organic Field-Effect Transistor [OFET]	2924/14362	. . . . . RAS Only Refresh [ROR]
2924/13071	. . . . . Ballistic transistor	2924/14363	. . . . . CAS before RAS refresh [CBR]
2924/13072	. . . . . Sensor FET	2924/14364	. . . . . Multibank DRAM [MDRAM]
2924/13073	. . . . . ion-sensitive field-effect transistor [ISFET]	2924/14365	. . . . . Video DRAM [VRAM]
2924/13074	. . . . . Electrolyte-oxide-semiconductor field effect transistor [EOSFET], e.g. Neurochip	2924/14366	. . . . . Window DRAM [WRAM]
2924/13075	. . . . . Deoxyribonucleic acid field-effect transistor [DNAFET]	2924/14367	. . . . . Fast page mode DRAM [FPM DRAM]
2924/13076	. . . . . DEPFET	2924/14368	. . . . . Extended data out DRAM [EDO DRAM]
2924/13078	. . . . . Unijunction transistors	2924/14369	. . . . . Burst EDO DRAM [BEDO DRAM]
2924/13079	. . . . . Single-electron transistors [SET]	2924/1437	. . . . . Static random-access memory [SRAM]
2924/1308	. . . . . Nanofluidic transistor	2924/1438	. . . . . Flash memory
2924/13081	. . . . . Multigate devices	2924/1441	. . . . . Ferroelectric RAM [FeRAM or FRAM]
2924/13082	. . . . . Tetrode transistor	2924/1442	. . . . . Synchronous graphics RAM [SGRAM]
2924/13083	. . . . . Pentode transistor	2924/1443	. . . . . Non-volatile random-access memory [NVRAM]
2924/13084	. . . . . Trigate transistor	2924/1444	. . . . . PBRAM
2924/13085	. . . . . Dual gate FETs	2924/145	. . . . . Read-only memory [ROM]
2924/13086	. . . . . Junctionless Nanowire Transistor [JNT]	2924/1451	. . . . . EPROM
2924/13087	. . . . . Vertical-Slit Field-Effect Transistor [VeSFET]	2924/14511	. . . . . EEPROM
2924/13088	. . . . . Graphene Nanoribbon Field-Effect Transistor [GNRFET]	2924/1453	. . . . . PROM
2924/13089	. . . . . Nanoparticle Organic Memory Field-Effect Transistor [NOMFET]	2924/146	. . Mixed devices
2924/1309	. . . . . Modulation-Doped Field Effect Transistor [MODFET]	2924/1461	. . . MEMS
2924/13091	. . . . . Metal-Oxide-Semiconductor Field-Effect Transistor [MOSFET]	2924/15	. Details of package parts other than the semiconductor or other solid state devices to be connected
2924/13092	. . . . . Dual Gate Metal-Oxide-Semiconductor Field-Effect Transistor [DGMOSFET]	2924/151	. . Die mounting substrate
2924/14	. . . Integrated circuits	2924/1511	. . . Structure
2924/141	. . . . Analog devices	2924/1515	. . . Shape
2924/142	. . . . HF devices	2924/15151	. . . the die mounting substrate comprising an aperture, e.g. for underfilling, outgassing, window type wire connections
2924/1421	. . . . RF devices	2924/15153	. . . the die mounting substrate comprising a recess for hosting the device
2924/14211	. . . . . Voltage-controlled oscillator [VCO]	2924/15155	. . . the shape of the recess being other than a cuboid
2924/14215	. . . . . Low-noise amplifier [LNA]	2924/15156	. . . . Side view
2924/1422	. . . . . Mixer	2924/15157	. . . . Top view
2924/14221	. . . . . Electronic mixer	2924/15158	. . . the die mounting substrate being other than a cuboid
2924/14222	. . . . . Frequency mixer	2924/15159	. . . . Side view
2924/1423	. . . . Monolithic Microwave Integrated Circuit [MMIC]	2924/15162	. . . . Top view
2924/1424	. . . . Operational amplifier	2924/15165	. . . Monolayer substrate
2924/1425	. . . . Converter	2924/1517	. . . Multilayer substrate
2924/14251	. . . . . Frequency converter	2924/15172	. . . Fan-out arrangement of the internal vias
2924/14252	. . . . . Voltage converter	2924/15173	. . . in a single layer of the multilayer substrate
2924/14253	. . . . . Digital-to-analog converter [DAC]	2924/15174	. . . in different layers of the multilayer substrate
2924/1426	. . . . Driver	2924/15182	. . . Fan-in arrangement of the internal vias
2924/1427	. . . . Voltage regulator [VR]	2924/15183	. . . in a single layer of the multilayer substrate
2924/143	. . . . Digital devices	2924/15184	. . . in different layers of the multilayer substrate
2924/1431	. . . . Logic devices	2924/15192	. . . Resurf arrangement of the internal vias
2924/1432	. . . . Central processing unit [CPU]	2924/152	. . . Disposition
2924/1433	. . . . Application-specific integrated circuit [ASIC]	2924/153	. . . Connection portion
2924/14335	. . . . . Digital signal processor [DSP]	2924/1531	. . . the connection portion being formed only on the surface of the substrate opposite to the die mounting surface
2924/1434	. . . . Memory	2924/15311	. . . being a ball array, e.g. BGA
2924/1435	. . . . . Random access memory [RAM]		
2924/1436	. . . . . Dynamic random-access memory [DRAM]		
2924/14361	. . . . . Synchronous dynamic random access memory [SDRAM]		

2924/15312	. . . . .	being a pin array, e.g. PGA	2924/16153	. . . . .	Cap enclosing a plurality of side-by-side cavities [e.g. E-shaped cap]
2924/15313	. . . . .	being a land array, e.g. LGA	2924/1616	. . . . .	Cavity shape
2924/1532	. . . . .	the connection portion being formed on the die mounting surface of the substrate	2924/1617	. . . . .	Cavity coating
2924/15321	. . . . .	being a ball array, e.g. BGA	2924/16171	. . . . .	Material
2924/15322	. . . . .	being a pin array, e.g. PGA	2924/16172	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2924/15323	. . . . .	being a land array, e.g. LGA	2924/16173	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2924/1533	. . . . .	the connection portion being formed both on the die mounting surface of the substrate and outside the die mounting surface of the substrate	2924/16174	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides (glass ceramics H01L 2924/16175)
2924/15331	. . . . .	being a ball array, e.g. BGA	2924/16175	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
2924/15332	. . . . .	being a pin array, e.g. PGA	2924/16176	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2924/15333	. . . . .	being a land array, e.g. LGA	2924/16177	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2924/156	. . . . .	Material	2924/16178	. . . . .	with a principal constituent of the material being a solid not provided for in groups H01L 2924/157 - H01L 2924/15791 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2924/157	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2924/16179	. . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2924/15701	. . . . .	the principal constituent melting at a temperature of less than 400 C	2924/1619	. . . . .	Cavity coating shape
2924/15717	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400 C and less than 950 C	2924/16195	. . . . .	Flat cap [not enclosing an internal cavity]
2924/15724	. . . . .	Aluminium [Al] as principal constituent	2924/16196	. . . . .	Cap forming a cavity, e.g. being a curved metal foil
2924/15738	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950 C and less than 1550 C	2924/162	. . . . .	Disposition
2924/15747	. . . . .	Copper [Cu] as principal constituent	2924/16235	. . . . .	Connecting to a semiconductor or solid-state bodies, i.e. cap-to-chip
2924/1576	. . . . .	Iron [Fe] as principal constituent	2924/16251	. . . . .	Connecting to an item not being a semiconductor or solid-state body, e.g. cap-to-substrate
2924/15763	. . . . .	the principal constituent melting at a temperature of greater than 1550 C	2924/1626	. . . . .	Cap-in-cap assemblies
2924/15786	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2924/1627	. . . . .	stacked type assemblies, e.g. stacked multi-cavities
2924/15787	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides	2924/163	. . . . .	Connection portion, e.g. seal
2924/15788	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides	2924/1631	. . . . .	Structure
2924/1579	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2924/16315	. . . . .	Shape
2924/15791	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2924/1632	. . . . .	Disposition
2924/15793	. . . . .	with a principal constituent of the material being a solid not provided for in groups H01L 2924/157 - H01L 2924/15791 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2924/164	. . . . .	Material
2924/15798	. . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2924/165	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2924/161	. . . . .	Cap	2924/16586	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2924/1611	. . . . .	Structure			
2924/1615	. . . . .	Shape			
2924/16151	. . . . .	Cap comprising an aperture, e.g. for pressure control, encapsulation			
2924/16152	. . . . .	Cap comprising a cavity for hosting the device, e.g. U-shaped cap			

2924/16587	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides	2924/173	. . .	Connection portion, e.g. seal
2924/16588	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides	2924/176	. . .	Material
2924/1659	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2924/177	. . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2924/16593	. . . . .	with a principal constituent of the material being a solid not provided for in groups H01L 2924/157 - H01L 2924/15791 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2924/17701	. . . . .	the principal constituent melting at a temperature of less than 400 C
2924/16598	. . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2924/17717	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400 C and less than 950 C
2924/166	. . .	Material	2924/17724	. . . . .	Aluminium [Al] as principal constituent
2924/167	. . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2924/17738	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950 C and less than 1550 C
2924/16701	. . . . .	the principal constituent melting at a temperature of less than 400 C	2924/17747	. . . . .	Copper [Cu] as principal constituent
2924/16717	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400 C and less than 950 C	2924/1776	. . . . .	Iron [Fe] as principal constituent
2924/16724	. . . . .	Aluminium [Al] as principal constituent	2924/17763	. . . . .	the principal constituent melting at a temperature of greater than 1550 C
2924/16738	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950 C and less than 1550 C	2924/17786	. . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2924/16747	. . . . .	Copper [Cu] as principal constituent	2924/17787	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides
2924/1676	. . . . .	Iron [Fe] as principal constituent	2924/17788	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
2924/16763	. . . . .	the principal constituent melting at a temperature of greater than 1550 C	2924/1779	. . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2924/16786	. . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2924/17791	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2924/16787	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides	2924/17793	. . . .	with a principal constituent of the material being a solid not provided for in groups H01L 2924/177 - H01L 2924/17791 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2924/16788	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides	2924/17798	. . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2924/1679	. . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2924/181	. .	Encapsulation
2924/16791	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2924/1811	. . .	Structure
2924/16793	. . . .	with a principal constituent of the material being a solid not provided for in groups H01L 2924/167 - H01L 2924/16791 , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2924/1815	. . .	Shape
2924/16798	. . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2924/1816	. . . .	Exposing the passive side of the semiconductor or solid-state body
2924/171	. .	Frame	2924/18161	. . . . .	of a flip chip
2924/1711	. . .	Structure	2924/18162	. . . . .	of a chip with build-up interconnect
2924/1715	. . .	Shape	2924/18165	. . . . .	of a wire bonded chip
2924/17151	. . . .	Frame comprising an aperture, e.g. for pressure control, encapsulation	2924/182	. . .	Disposition
2924/172	. . .	Disposition	2924/183	. . .	Connection portion, e.g. seal
			2924/18301	. . . .	being an anchoring portion, i.e. mechanical interlocking between the encapsulation resin and another package part
			2924/186	. . .	Material
			2924/19	. .	Details of hybrid assemblies other than the semiconductor or other solid state devices to be connected
			2924/1901	. .	Structure
			2924/19011	. . .	including integrated passive components
			2924/19015	. . .	including thin film passive components
			2924/1902	. . .	including thick film passive components

2924/1903	. . .	including wave guides	2924/20262	. . . .	IR-B $1400 \leq W < 3000$ nm, i.e. 100THz-215 THz
2924/19031	. . . .	being a strip line type	2924/20263	. . . .	IR-C $3000 \text{ nm} \leq W < 1 \text{ mm}$, i.e. 300 GHz-100THz
2924/19032	. . . .	being a microstrip line type	2924/2027	. . .	Radio $1 \text{ mm} - \text{km}$ 300 GHz - 3 Hz
2924/19033	. . . .	being a coplanar line type	2924/20271	. . . .	Microwave radiation $1 \text{ mm} - 1 \text{ meter}$, i.e. 300 GHz - 300 MHz
2924/19038	. . . .	being a hybrid line type	2924/203	. .	Ultrasonic frequency ranges, i.e. KHz
2924/19039	. . . . .	impedance transition between different types of wave guides	2924/20301	. . .	Ultrasonic frequency [f] $f < 25 \text{ kHz}$
2924/1904	. . .	Component type	2924/20302	. . .	Ultrasonic frequency [f] $25 \text{ KHz} \leq f < 50 \text{ KHz}$
2924/19041	. . . .	being a capacitor	2924/20303	. . .	Ultrasonic frequency [f] $50 \text{ KHz} \leq f < 75 \text{ KHz}$
2924/19042	. . . .	being an inductor	2924/20304	. . .	Ultrasonic frequency [f] $75 \text{ KHz} \leq f < 100 \text{ KHz}$
2924/19043	. . . .	being a resistor	2924/20305	. . .	Ultrasonic frequency [f] $100 \text{ KHz} \leq f < 125 \text{ KHz}$
2924/1905	. .	Shape	2924/20306	. . .	Ultrasonic frequency [f] $125 \text{ KHz} \leq f < 150 \text{ KHz}$
2924/19051	. . .	Impedance matching structure [e.g. balun]	2924/20307	. . .	Ultrasonic frequency [f] $150 \text{ KHz} \leq f < 175 \text{ KHz}$
2924/191	. .	Disposition	2924/20308	. . .	Ultrasonic frequency [f] $175 \text{ KHz} \leq f < 200 \text{ KHz}$
2924/19101	. . .	of discrete passive components	2924/20309	. . .	Ultrasonic frequency [f] $f \geq 200 \text{ KHz}$
2924/19102	. . . .	in a stacked assembly with the semiconductor or solid state device	2924/206	. .	Length ranges
2924/19103	. . . . .	interposed between the semiconductor or solid-state device and the die mounting substrate, i.e. chip-on-passive	2924/2064	. . .	larger or equal to 1 micron less than 100 microns
2924/19104	. . . . .	on the semiconductor or solid-state device, i.e. passive-on-chip	2924/20641	. . .	larger or equal to 100 microns less than 200 microns
2924/19105	. . . .	in a side-by-side arrangement on a common die mounting substrate	2924/20642	. . .	larger or equal to 200 microns less than 300 microns
2924/19106	. . . .	in a mirrored arrangement on two different side of a common die mounting substrate	2924/20643	. . .	larger or equal to 300 microns less than 400 microns
2924/19107	. . . .	off-chip wires	2924/20644	. . .	larger or equal to 400 microns less than 500 microns
2924/20	. .	Parameters	2924/20645	. . .	larger or equal to 500 microns less than 600 microns
2924/201	. .	Temperature ranges	2924/20646	. . .	larger or equal to 600 microns less than 700 microns
2924/20101	. . .	Temperature range $T < 0 \text{ C}$, $T < 273.15 \text{ K}$	2924/20647	. . .	larger or equal to 700 microns less than 800 microns
2924/20102	. . .	Temperature range $0 \text{ C} \leq T < 60 \text{ C}$, $273.15 \text{ K} \leq T < 333.15 \text{ K}$	2924/20648	. . .	larger or equal to 800 microns less than 900 microns
2924/20103	. . .	Temperature range $60 \text{ C} \leq T < 100 \text{ C}$, $333.15 \text{ K} \leq T < 373.15 \text{ K}$	2924/20649	. . .	larger or equal to 900 microns less than 1000 microns
2924/20104	. . .	Temperature range $100 \text{ C} \leq T < 150 \text{ C}$, $373.15 \text{ K} \leq T < 423.15 \text{ K}$	2924/2065	. . .	larger or equal to 1000 microns less than 1500 microns
2924/20105	. . .	Temperature range $150 \text{ C} \leq T < 200 \text{ C}$, $423.15 \text{ K} \leq T < 473.15 \text{ K}$	2924/20651	. . .	larger or equal to 1500 microns less than 2000 microns
2924/20106	. . .	Temperature range $200 \text{ C} \leq T < 250 \text{ C}$, $473.15 \text{ K} \leq T < 523.15 \text{ K}$	2924/20652	. . .	larger or equal to 2000 microns less than 2500 microns
2924/20107	. . .	Temperature range $250 \text{ C} \leq T < 300 \text{ C}$, $523.15 \text{ K} \leq T < 573.15 \text{ K}$	2924/20653	. . .	larger or equal to 2500 microns less than 3000 microns
2924/20108	. . .	Temperature range $300 \text{ C} \leq T < 350 \text{ C}$, $573.15 \text{ K} \leq T < 623.15 \text{ K}$	2924/20654	. . .	larger or equal to 3000 microns less than 4000 microns
2924/20109	. . .	Temperature range $350 \text{ C} \leq T < 400 \text{ C}$, $623.15 \text{ K} \leq T < 673.15 \text{ K}$	2924/20655	. . .	larger or equal to 4000 microns less than 5000 microns
2924/2011	. . .	Temperature range $400 \text{ C} \leq T < 450 \text{ C}$, $673.15 \text{ K} \leq T < 723.15 \text{ K}$	2924/20656	. . .	larger or equal to 5000 microns less than 6000 microns
2924/20111	. . .	Temperature range $450 \text{ C} \leq T < 500 \text{ C}$, $723.15 \text{ K} \leq T < 773.15 \text{ K}$	2924/20657	. . .	larger or equal to 6000 microns less than 7000 microns
2924/202	. .	Electromagnetic wavelength ranges [W]	2924/20658	. . .	larger or equal to 7000 microns less than 8000 microns
2924/20201	. . .	Gamma radiation, i.e. wavelength less than 0.01 nm	2924/207	. .	Diameter ranges
2924/20202	. . .	X-ray radiation, i.e. wavelength 0.01 to 10 nm	2924/2075	. . .	larger or equal to 1 micron less than 10 microns
2924/2021	. . .	Ultraviolet radiation	2924/20751	. . .	larger or equal to 10 microns less than 20 microns
2924/20211	. . . .	UV-C $100 \leq W < 280 \text{ nm}$			
2924/20212	. . . .	UV-B $280 \leq W < 315 \text{ nm}$			
2924/20213	. . . .	UV-A $315 \leq W < 400 \text{ nm}$			
2924/2024	. . .	Visible spectrum wavelength $390 \leq W < 700 \text{ nm}$, i.e. 400-790 THz			
2924/2026	. . .	Infrared radiation $700 \leq W < 3000 \text{ nm}$			
2924/20261	. . . .	IR-A $700 \leq W < 1400 \text{ nm}$, i.e. 215 THz-430 THz			

2924/20752	. . .	larger or equal to 20 microns less than 30 microns
2924/20753	. . .	larger or equal to 30 microns less than 40 microns
2924/20754	. . .	larger or equal to 40 microns less than 50 microns
2924/20755	. . .	larger or equal to 50 microns less than 60 microns
2924/20756	. . .	larger or equal to 60 microns less than 70 microns
2924/20757	. . .	larger or equal to 70 microns less than 80 microns
2924/20758	. . .	larger or equal to 80 microns less than 90 microns
2924/20759	. . .	larger or equal to 90 microns less than 100 microns
2924/2076	. . .	equal to or larger than 100 microns
2924/30	.	Technical effects
2924/301	. .	Electrical effects
2924/30101	. . .	Resistance
2924/30105	. . .	Capacitance
2924/30107	. . .	Inductance
2924/3011	. . .	Impedance
2924/30111	. . . .	matching
2924/302	. . .	Electrostatic
2924/30201	. . . .	Charge
2924/30205	. . . .	Discharge
2924/3025	. . .	Electromagnetic shielding
2924/35	. .	Mechanical effects
2924/351	. . .	Thermal stress
2924/3511	. . . .	Warping
2924/3512	. . . .	Cracking
2924/35121	. . . . .	Peeling or delaminating
2924/36	. .	Material effects
2924/364	. . .	Polymers
2924/3641	. . . .	Outgassing
2924/365	. . .	Metallurgical effects
2924/3651	. . . .	Formation of intermetallics
2924/36511	. . . . .	Purple plague
2924/3656	. . . .	Formation of Kirkendall voids
2924/37	. .	Effects of the manufacturing process
2924/37001	. . .	Yield
2924/37002	. . .	Shelf life
2924/3701	. . .	increased through put
2924/38	. .	Effects and problems related to the device integration
2924/381	. . .	Pitch distance
2924/384	. . .	Bump effects
2924/3841	. . . .	Solder bridging
2924/386	. . .	Wire effects
2924/3861	. . . .	Sag
2924/3862	. . . .	Sweep
2924/40	.	Details of apparatuses used for either manufacturing connectors or connecting the semiconductor or solid-state body
2924/401	. .	LASER
2924/40101	. . .	Mode
2924/40102	. . . .	being pulsed
2924/40103	. . . .	being continuous
2924/40105	. . .	Beam details
2924/4015	. . . .	Shape
2924/402	. . .	Type
2924/40201	. . . .	being a chemical
2924/40202	. . . . .	Deuterium Fluoride [DF] LASER
2924/40203	. . . . .	Hydrogen Fluoride [HF] LASER
2924/40207	. . . . .	Dye laser
2924/4025	. . . .	being a gas
2924/40251	. . . . .	argon-ion LASER
2924/40252	. . . . .	CO ₂ LASER
2924/40253	. . . . .	HeAg LASER
2924/40254	. . . . .	HeNe LASER
2924/40255	. . . . .	NeCu LASER
2924/403	. . . .	being an Excimer
2924/40301	. . . . .	ArF LASER
2924/40302	. . . . .	F ₂ LASER
2924/40303	. . . . .	KrCl LASER
2924/40304	. . . . .	KrF LASER
2924/40305	. . . . .	XeCl LASER
2924/40306	. . . . .	XeF LASER
2924/4035	. . . .	being a fiber hosted LASER
2924/404	. . . .	being a solid state
2924/40401	. . . . .	Free electron LASER
2924/40402	. . . . .	Photonic crystal LASER
2924/40403	. . . . .	Fiber solid state LASER
2924/40404	. . . . .	Yttrium Aluminium Garnet Nd:YAG LASER
2924/40405	. . . . .	Yttrium Lithium Fluoride Nd:YLF LASER
2924/40406	. . . . .	Ruby LASER
2924/40407	. . . . .	Yb:YAG LASER
2924/405	. . .	Wavelength
2924/40501	. . . .	UV spectrum
2924/40502	. . . .	Visible spectrum
2924/40503	. . . .	IR spectrum
2933/00		Details relating to devices covered by the group H01L 33/00 but not provided for in its subgroups
2933/0008	. .	Processes
2933/0016	. .	relating to electrodes
2933/0025	. .	relating to coatings
2933/0033	. .	relating to semiconductor body packages
2933/0041	. . .	relating to wavelength conversion elements
2933/005	. . .	relating to encapsulations
2933/0058	. . .	relating to optical field-shaping elements
2933/0066	. . .	relating to arrangements for conducting electric current to or from the semiconductor body
2933/0075	. . .	relating to heat extraction or cooling elements
2933/0083	. .	Periodic patterns for optical field-shaping in or on the semiconductor body or semiconductor body package, e.g. photonic bandgap structures
2933/0091	. .	Scattering means in or on the semiconductor body or semiconductor body package (H01L 33/22 takes precedence)