

**CPC****COOPERATIVE PATENT CLASSIFICATION****B81C****PROCESSES OR APPARATUS SPECIALLY ADAPTED FOR THE MANUFACTURE OR TREATMENT OF MICRO-STRUCTURAL DEVICES OR SYSTEMS** (making microcapsules or microballoons

[B01J 13/02](#); processes or apparatus peculiar to the manufacture or treatment of piezo-electric, electrostrictive or magnetostrictive element per se [H01L 41/22](#))

**NOTES**

1. This subclass does not cover:
  - processes or apparatus for the manufacture or treatment of purely electrical or electronic devices, which are covered by section H, e.g. group [H01L 21/00](#);
  - processes or apparatus involving the manipulation of single atoms or molecules, which are covered by group [B82B 3/00](#).
2. In this subclass, local "residual" subgroups, e.g. [B81C 1/00126](#), are used with the following purpose.  
 When classifying a document which does not fit in any of a set of subgroups with the same dot-level, the document should be classified in the residual group, if present, and not in the group at the hierarchical level one dot above.  
 In the example, the document shall be classified in [B81C 1/00126](#) and not in [B81C 1/00023](#) as [B81C 1/00126](#) is "residual" to [B81C 1/00031-B81C 1/00119](#)

**B81C 1/00****Manufacture or treatment of devices or systems in or on a substrate**  
([B81C 3/00](#) takes precedence)

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|------------------------------|--|
| <a href="#">B81C 1/00007</a> | . {Assembling automatically hinged components, i.e. self-assembly processes (self-assembly mechanisms <a href="#">B81B 7/0003</a> )}   |
| <a href="#">B81C 1/00015</a> | . {for manufacturing micro-systems}  |
| <a href="#">B81C 1/00023</a> | . . {without movable or flexible elements (array of static structures for functionalising surfaces in <a href="#">B81C 1/00206</a> ; manufacture of MEMS devices for specific applications, see relevant places, e.g. microreactors <a href="#">B01J 19/0093</a> , lab-on-chip <a href="#">B01L 3/5027</a> , micromixers <a href="#">B01F 13/0059</a> )} |
| <a href="#">B81C 1/00031</a> | . . . {Regular or irregular arrays of nanoscale structures, e.g. etch mask layer (photomechanical, e.g. photolithographic, production of textured or patterned surfaces <a href="#">G03F 7/00</a> ; lithographic processes for making patterned surfaces using printing and stamping <a href="#">G03F 7/0002</a> )}                                      |
| <a href="#">B81C 1/00039</a> | . . . {Anchors}  |
| <a href="#">B81C 1/00047</a> | . . . {Cavities}   |
| <a href="#">B81C 1/00055</a> | . . . {Grooves}  |
| <a href="#">B81C 1/00063</a> | . . . . {Trenches}   |
| <a href="#">B81C 1/00071</a> | . . . . {Channels}   |
| <a href="#">B81C 1/00079</a> | . . . . {Grooves not provided for in groups <a href="#">B81C 1/00063</a> to <a href="#">B81C 1/00071</a> }   |
| <a href="#">B81C 1/00087</a> | . . . {Holes}  |
| <a href="#">B81C 1/00095</a> | . . . {Interconnects}  |
| <a href="#">B81C 1/00103</a> | . . . {Structures having a predefined profile, e.g. sloped or rounded grooves}   |

B81C 1/00111	. . . {Tips, pillars, i.e. raised structures ( <a href="#">microneedles A61M 37/0015</a> )}
B81C 1/00119	. . . {Arrangement of basic structures like cavities or channels, e.g. suitable for microfluidic systems}
B81C 1/00126	. . . {Static structures not provided for in groups <a href="#">B81C 1/00031</a> to <a href="#">B81C 1/00119</a> }
B81C 1/00134	. . . {comprising flexible or deformable structures (manufacture of MEMS devices for specific applications, see relevant places, e.g. gyroscopes <a href="#">G01C 19/5719</a> , pressure sensors <a href="#">G01L 9/0042</a> , accelerometers <a href="#">G01P 15/0802</a> , acoustic transducers or diaphragms therefor <a href="#">H04R 31/00</a> )}
B81C 1/00142	. . . {Bridges (deformable micro-mirrors <a href="#">G02B 26/0841</a> )}
B81C 1/0015	. . . {Cantilevers (switches using MEMS <a href="#">H01H 1/0036</a> ; electrostatic relays using micromechanics <a href="#">H01H 59/0009</a> ; micro-electro-mechanical resonators <a href="#">H03H 9/02244</a> )}
B81C 1/00158	. . . {Diaphragms, membranes (manufacture process for semi-permeable inorganic membranes <a href="#">B01D 67/0039</a> )}
B81C 1/00166	. . . {Electrodes}
B81C 1/00174	. . . {See-saws}
B81C 1/00182	. . . {Arrangements of deformable or non-deformable structures, e.g. membrane and cavity for use in a transducer}
B81C 1/0019	. . . {Flexible or deformable structures not provided for in groups <a href="#">B81C 1/00142</a> to <a href="#">B81C 1/00182</a> }
B81C 1/00198	. . . {comprising elements which are movable in relation to each other, e.g. comprising slidable or rotatable elements}
B81C 1/00206	. . . {Processes for functionalising a surface, e.g. provide the surface with specific mechanical, chemical or biological properties}
B81C 1/00214	. . . {Processes for the simultaneous manufacturing of a network or an array of similar micro-structural devices}
B81C 1/00222	. . . {Integrating an electronic processing unit with a micromechanical structure}
B81C 1/0023	. . . {Packaging together an electronic processing unit die and a micromechanical structure die (MEMS packages <a href="#">B81B 7/0032</a> ; MEMS packaging processes <a href="#">B81C 1/00261</a> )}
B81C 1/00238	. . . {Joining a substrate with an electronic processing unit and a substrate with a micromechanical structure}
B81C 1/00246	. . . {Monolithic integration, i.e. micromechanical structure and electronic processing unit are integrated on the same substrate}
B81C 1/00253	. . . {Processes for integrating an electronic processing unit with a micromechanical structure not provided for in <a href="#">B81C 1/0023</a> to <a href="#">B81C 1/00246</a> }
B81C 1/00261	. . . {Processes for packaging MEMS devices (MEMS packages <a href="#">B81B 7/0032</a> , packaging of smart-MEMS <a href="#">B81C 1/0023</a> )}
B81C 1/00269	. . . {Bonding of solid lids or wafers to the substrate}
B81C 1/00277	. . . {for maintaining a controlled atmosphere inside of the cavity containing the MEMS}
B81C 1/00285	. . . . {using materials for controlling the level of pressure, contaminants or moisture inside of the package, e.g. getters}
B81C 1/00293	. . . . {maintaining a controlled atmosphere with processes not provided for in <a href="#">B81C 1/00285</a> }

- B81C 1/00301 . . . {Connecting electric signal lines from the MEMS device with external electrical signal lines, e.g. through vias}
- B81C 1/00309 . . . {suitable for fluid transfer from the MEMS out of the package or vice-versa, e.g. transfer of liquid, gas, sound}
- B81C 1/00317 . . . {Packaging optical devices}
- B81C 1/00325 . . . {for reducing stress inside of the package structure}
- B81C 1/00333 . . . {Aspects relating to packaging of MEMS devices, not covered by groups [B81C 1/00269](#) to [B81C 1/00325](#)}
- B81C 1/00341 . . {Processes for manufacturing micro-systems not provided for in groups [B81C 1/00023](#) to [B81C 1/00261](#)}
- B81C 1/00349 . {Creating layers of material on a substrate}
- B81C 1/00357 . . {involving bonding one or several substrates on a non-temporary support, e.g. another substrate}
- B81C 1/00365 . . {having low tensile stress between layers}
- B81C 1/00373 . . {Selective deposition, e.g. printing or micro-contact printing}
- B81C 1/0038 . . {Processes for creating layers of materials not provided for in groups [B81C 1/00357](#) to [B81C 1/00373](#)}
- B81C 1/00388 . {Etch mask forming}
- B81C 1/00396 . . {Mask characterised by its composition, e.g. multilayer masks}
- B81C 1/00404 . . {Mask characterised by its size, orientation or shape}
- B81C 1/00412 . . {Mask characterised by its behaviour during the etching process, e.g. soluble masks}
- B81C 1/0042 . . {Compensation masks in orientation dependent etching}
- B81C 1/00428 . . {Etch mask forming processes not provided for in groups [B81C 1/00396](#) to [B81C 1/0042](#)}
- B81C 1/00436 . {Shaping materials, i.e. techniques for structuring the substrate or the layers on the substrate}
- B81C 1/00444 . . {Surface micromachining, i.e. structuring layers on the substrate}
- B81C 1/0046 . . . {using stamping, e.g. imprinting ([nano-imprinting for making etch masks G03F 7/0002](#))}
- B81C 1/00468 . . . {Releasing structures}
- B81C 1/00476 . . . . {removing a sacrificial layer ([B81C 1/00912](#) takes precedence)}
- B81C 1/00484 . . . . {Processes for releasing structures not provided for in group [B81C 1/00476](#)}
- B81C 1/00492 . . . {Processes for surface micromachining not provided for in groups [B81C 1/0046](#) to [B81C 1/00484](#)}
- B81C 1/005 . . {Bulk micromachining}
- B81C 1/00507 . . . {Formation of buried layers by techniques other than deposition, e.g. by deep implantation of elements ([SIMOX techniques H01L 21/762](#))}
- B81C 1/00515 . . . {Bulk micromachining techniques not provided for in [B81C 1/00507](#)}
- B81C 1/00523 . . {Etching material}
- B81C 1/00531 . . . {Dry etching}
- B81C 1/00539 . . . {Wet etching}
- B81C 1/00547 . . . {Etching processes not provided for in groups [B81C 1/00531](#) to [B81C 1/00539](#)}

- B81C 1/00555 . . {Achieving a desired geometry, i.e. controlling etch rates, anisotropy or selectivity (B81C 1/00023 to B81C 1/0019 take precedence)}
- B81C 1/00563 . . . {Avoid or control over-etching}
- B81C 1/00571 . . . . {Avoid or control under-cutting}
- B81C 1/00579 . . . . {Avoid charge built-up}
- B81C 1/00587 . . . . {Processes for avoiding or controlling over-etching not provided for in B81C 1/00571 to B81C 1/00579}
- B81C 1/00595 . . . {Control etch selectivity}
- B81C 1/00603 . . . {Aligning features and geometries on both sides of a substrate, e.g. when double side etching}
- B81C 1/00611 . . . {Processes for the planarisation of structures (planarising depositions C23C, H01L)}
- B81C 1/00619 . . . {Forming high aspect ratio structures having deep steep walls}
- B81C 1/00626 . . . {Processes for achieving a desired geometry not provided for in groups B81C 1/00563 to B81C 1/00619}
- B81C 1/00634 . . {Processes for shaping materials not provided for in groups B81C 1/00444 to B81C 1/00626}
- B81C 1/00642 . {for improving the physical properties of a device}
- B81C 1/0065 . . {Mechanical properties}
- B81C 1/00658 . . . {Treatments for improving the stiffness of a vibrating element}
- B81C 1/00666 . . . {Treatments for controlling internal stress or strain in MEMS structures}
- B81C 1/00674 . . . {Treatments for improving wear resistance}
- B81C 1/00682 . . . {Treatments for improving mechanical properties, not provided for in B81C 1/00658 to B81C 1/0065}
- B81C 1/0069 . . {Thermal properties, e.g. improve thermal insulation}
- B81C 1/00698 . . {Electrical characteristics, e.g. by doping materials}
- B81C 1/00706 . . {Magnetic properties}
- B81C 1/00714 . . {Treatment for improving the physical properties not provided for in groups B81C 1/0065 to B81C 1/00706}
- B81C 1/00777 . {Preserve existing structures from alteration, e.g. temporary protection during manufacturing}
- B81C 1/00785 . . {Avoid chemical alteration, e.g. contamination, oxidation or unwanted etching (B81C 1/00563 to B81C 1/00595 take precedence)}
- B81C 1/00793 . . . {Avoid contamination, e.g. absorption of impurities or oxidation}
- B81C 1/00801 . . . {Avoid alteration of functional structures by etching, e.g. using a passivation layer or an etch stop layer (B81C 1/00595, B81C 1/00468 take precedence)}
- B81C 1/00809 . . . {Methods to avoid chemical alteration not provided for in groups B81C 1/00793 to B81C 1/00801}
- B81C 1/00817 . . {Avoid thermal destruction}
- B81C 1/00825 . . {Protect against mechanical threats, e.g. against shocks, or residues (B81C 1/00261 take precedence)}
- B81C 1/00833 . . {Methods for preserving structures not provided for in groups B81C 1/00785 to B81C 1/00825}

- B81C 1/00841 . {Cleaning during or after manufacture (cleaning of semiconductor devices [H01L 21/306](#))}
- B81C 1/00849 . . {during manufacture}
- B81C 1/00857 . . {after manufacture, e.g. back-end of the line process}
- B81C 1/00865 . {Multistep processes for the separation of wafers into individual elements}
- B81C 1/00873 . . {characterised by special arrangements of the devices, allowing an easier separation}
- B81C 1/0088 . . {Separation allowing recovery of the substrate or a part of the substrate, e.g. epitaxial lift-off}
- B81C 1/00888 . . {Multistep processes involving only mechanical separation, e.g. grooving followed by cleaving}
- B81C 1/00896 . . {Temporary protection during separation into individual elements}
- B81C 1/00904 . . {Multistep processes for the separation of wafers into individual elements not provided for in groups [B81C 1/00873](#) to [B81C 1/00896](#)}
- B81C 1/00912 . {Treatments or methods for avoiding stiction of flexible or moving parts of MEMS}
- B81C 1/0092 . . {For avoiding stiction during the manufacturing process of the device, e.g. during wet etching}
- B81C 1/00928 . . . {Eliminating or avoiding remaining moisture after the wet etch release of the movable structure}
- B81C 1/00936 . . . {Releasing the movable structure without liquid etchant}
- B81C 1/00944 . . . {Maintaining a critical distance between the structures to be released}
- B81C 1/00952 . . . {Treatments or methods for avoiding stiction during the manufacturing process not provided for in groups [B81C 1/00928](#) to [B81C 1/00944](#)}
- B81C 1/0096 . . {For avoiding stiction when the device is in use, i.e. after manufacture has been completed}
- B81C 1/00968 . . . {Methods for breaking the stiction bond}
- B81C 1/00976 . . . {Control methods for avoiding stiction, e.g. controlling the bias voltage}
- B81C 1/00984 . . . {Methods for avoiding stiction when the device is in use not provided for in groups [B81C 1/00968](#) to [B81C 1/00976](#)}
- B81C 1/00992 . . {Treatments or methods for avoiding stiction of flexible or moving parts of MEMS not provided for in groups [B81C 1/0092](#) to [B81C 1/00984](#)}

**B81C 3/00****Assembling of devices or systems from individually processed components**

- B81C 3/001 . {Bonding of two components}
- B81C 3/002 . {Aligning micro-parts}
- B81C 3/004 . . {Active alignment, i.e. moving the elements in response to the detected position of the elements using internal or external actuators}
- B81C 3/005 . . {Passive alignment, i.e. without a detection of the position of the elements or using only structural arrangements or thermodynamic forces}
- B81C 3/007 . . {Methods for aligning micro-parts not provided for in groups [B81C 3/004](#) to [B81C 3/005](#)}
- B81C 3/008 . {Aspects related to assembling from individually processed components, not covered by groups [B81C 3/001](#) to [B81C 3/002](#)}

**B81C 99/00****Subject matter not provided for in other groups of this subclass**

- B81C 99/0005 . {Apparatus specially adapted for the manufacture or treatment of micro-structural devices or systems, or methods for manufacturing the same}
- B81C 99/001 . . {for cutting, cleaving or grinding}
- B81C 99/0015 . . {for micro extrusion (extrusion heads in general [B29C 47/12](#))}
- B81C 99/002 . . {Apparatus for assembling MEMS, e.g. micro-manipulators (micro-manipulators per se [B25J 7/00](#))}
- B81C 99/0025 . . {Apparatus specially adapted for the manufacture or treatment of micro-structural devices or systems not provided for in [B81C 99/001](#) to [B81C 99/002](#)}
- B81C 99/003 . {Characterising MEMS devices, e.g. measuring and identifying electrical or mechanical constants}
- B81C 99/0035 . {Testing}
- B81C 99/004 . . {during manufacturing}
- B81C 99/0045 . . {End test of the packaged device}
- B81C 99/005 . . {Test apparatus}
- B81C 99/0055 . {Manufacturing logistics}
- B81C 99/006 . . {Design; Simulation}
- B81C 99/0065 . . {Process control; Yield prediction}
- B81C 99/007 . . {Marking}
- B81C 99/0075 . {Manufacture of substrate-free structures}
- B81C 99/008 . . {separating the processed structure from a mother substrate}
- B81C 99/0085 . . {using moulds and master templates, e.g. for hot-embossing}
- B81C 99/009 . . {Manufacturing the stamps or the moulds}
- B81C 99/0095 . . {Aspects relating to the manufacture of substrate-free structures, not covered by groups [B81C 99/008](#) to [B81C 99/009](#)}

## **B81C 2201/00      Manufacture or treatment of micro-structural devices or systems**

- B81C 2201/01 . in or on a substrate
- B81C 2201/0101 . . Shaping material; Structuring the bulk substrate or layers on the substrate; Film patterning
- B81C 2201/0102 . . . Surface micromachining
- B81C 2201/0104 . . . . Chemical-mechanical polishing [CMP]
- B81C 2201/0105 . . . . Sacrificial layer
- B81C 2201/0107 . . . . Sacrificial metal
- B81C 2201/0108 . . . . Sacrificial polymer, ashing of organics
- B81C 2201/0109 . . . . Sacrificial layers not provided for in [B81C 2201/0107](#) to [B81C 2201/0108](#)
- B81C 2201/0111 . . . Bulk micromachining
- B81C 2201/0112 . . . . Bosch process
- B81C 2201/0114 . . . . Electrochemical etching, anodic oxidation
- B81C 2201/0115 . . . . Porous silicon
- B81C 2201/0116 . . . . Thermal treatment for structural rearrangement of substrate atoms, e.g. for making buried cavities
- B81C 2201/0118 . . . Processes for the planarization of structures

B81C 2201/0119	. . . .	involving only addition of materials, i.e. additive planarization
B81C 2201/0121	. . . .	involving addition of material followed by removal of parts of said material, i.e. subtractive planarization
B81C 2201/0122	. . . .	Selective addition
B81C 2201/0123	. . . .	Selective removal
B81C 2201/0125	. . . .	Blanket removal, e.g. polishing
B81C 2201/0126	. . . .	Processes for the planarization of structures not provided for in <a href="#">B81C 2201/0119</a> to <a href="#">B81C 2201/0125</a>
B81C 2201/0128	. . . .	Processes for removing material
B81C 2201/0129	. . . .	Diamond turning
B81C 2201/013	. . . .	Etching
B81C 2201/0132	. . . . .	Dry etching, i.e. plasma etching, barrel etching, reactive ion etching [RIE], sputter etching or ion milling
B81C 2201/0133	. . . . .	Wet etching
B81C 2201/0135	. . . . .	Controlling etch progression
B81C 2201/0136	. . . . .	by doping limited material regions
B81C 2201/0138	. . . . .	Monitoring physical parameters in the etching chamber, e.g. pressure, temperature or gas composition
B81C 2201/0139	. . . . .	with the electric potential of an electrochemical etching
B81C 2201/014	. . . . .	by depositing an etch stop layer, e.g. silicon nitride, silicon oxide, metal
B81C 2201/0142	. . . . .	Processes for controlling etch progression not provided for in <a href="#">B81C 2201/0136</a> to <a href="#">B81C 2201/014</a>
B81C 2201/0143	. . . . .	Focussed beam, i.e. laser, ion or e-beam
B81C 2201/0145	. . . . .	Spark erosion
B81C 2201/0146	. . . . .	Processes for removing material not provided for in <a href="#">B81C 2201/0129</a> to <a href="#">B81C 2201/0145</a>
B81C 2201/0147	. . . .	Film patterning
B81C 2201/0149	. . . .	Forming nanoscale microstructures using auto-arranging or self-assembling material
B81C 2201/015	. . . .	Imprinting
B81C 2201/0152	. . . . .	Step and Flash imprinting, UV imprinting
B81C 2201/0153	. . . . .	Imprinting techniques not provided for in <a href="#">B81C 2201/0152</a>
B81C 2201/0154	. . . . .	other processes for film patterning not provided for in <a href="#">B81C 2201/0149</a> to <a href="#">B81C 2201/015</a>
B81C 2201/0156	. . . .	Lithographic techniques
B81C 2201/0157	. . . . .	Gray-scale mask technology
B81C 2201/0159	. . . . .	Lithographic techniques not provided for in <a href="#">B81C 2201/0157</a>
B81C 2201/016	. . . .	Passivation
B81C 2201/0161	. . . .	Controlling physical properties of the material
B81C 2201/0163	. . . .	Controlling internal stress of deposited layers
B81C 2201/0164	. . . . .	by doping the layer



B81C 2201/0166	. . . .	by ion implantation
B81C 2201/0167	. . . .	by adding further layers of materials having complementary strains, i.e. compressive or tensile strain
B81C 2201/0169	. . . .	by post-annealing
B81C 2201/017	. . . .	Methods for controlling internal stress of deposited layers not provided for in <a href="#">B81C 2201/0164</a> to <a href="#">B81C 2201/0169</a>
B81C 2201/0171	. . .	Doping materials
B81C 2201/0173	. . . .	Thermo-migration of impurities from a solid, e.g. from a doped deposited layer
B81C 2201/0174	. .	for making multi-layered devices, film deposition or growing
B81C 2201/0176	. . .	Chemical vapour Deposition
B81C 2201/0177	. . . .	Epitaxy, i.e. homo-epitaxy, hetero-epitaxy, GaAs-epitaxy
B81C 2201/0178	. . . .	Oxidation
B81C 2201/018	. . . .	Plasma polymerization, i.e. monomer or polymer deposition
B81C 2201/0181	. . .	Physical Vapour Deposition [PVD], i.e. evaporation, sputtering, ion plating or plasma assisted deposition, ion cluster beam technology
B81C 2201/0183	. . .	Selective deposition
B81C 2201/0184	. . . .	Digital lithography, e.g. using an inkjet print-head
B81C 2201/0185	. . . .	Printing, e.g. micro contact printing
B81C 2201/0187	. . . .	Controlled formation of micro- or nanostructures using a template positioned on a substrate
B81C 2201/0188	. . . .	Selective deposition techniques not provided for in <a href="#">B81C 2201/0184</a> to <a href="#">B81C 2201/0187</a>
B81C 2201/019	. . .	Bonding or gluing multiple substrate layers
B81C 2201/0191	. . .	Transfer of a layer from a carrier wafer to a device wafer
B81C 2201/0192	. . . .	by cleaving the carrier wafer
B81C 2201/0194	. . . .	the layer being structured
B81C 2201/0195	. . . .	the layer being unstructured
B81C 2201/0197	. . .	Processes for making multi-layered devices not provided for in groups <a href="#">B81C 2201/0176</a> to <a href="#">B81C 2201/0192</a>
B81C 2201/0198	. .	for making a masking layer
B81C 2201/03	. .	Processes for manufacturing substrate-free structures
B81C 2201/032	. .	LIGA process
B81C 2201/034	. .	Moulding
B81C 2201/036	. .	Hot embossing
B81C 2201/038	. .	Processes for manufacturing substrate-free structures not provided for in <a href="#">B81C 2201/034</a> to <a href="#">B81C 2201/036</a>
B81C 2201/05	. .	Temporary protection of devices or parts of the devices during manufacturing
B81C 2201/053	. .	Depositing a protective layers
B81C 2201/056	. .	Releasing structures at the end of the manufacturing process
B81C 2201/11	. .	Treatments for avoiding stiction of elastic or moving parts of MEMS



- B81C 2201/112 . . Depositing an anti-stiction or passivation coating, e.g. on the elastic or moving parts
- B81C 2201/115 . . Roughening a surface
- B81C 2201/117 . . Using supercritical fluid, e.g. carbon dioxide, for removing sacrificial layers

**B81C 2203/00****Forming micro-structural systems**

- B81C 2203/01 . Packaging MEMS
- B81C 2203/0109 . . Bonding an individual cap on the substrate
- B81C 2203/0118 . . Bonding a wafer on the substrate, i.e. where the cap consists of another wafer
- B81C 2203/0127 . . Using a carrier for applying a plurality of packaging lids to the system wafer
- B81C 2203/0136 . . Growing or depositing of a covering layer
- B81C 2203/0145 . . Hermetically sealing an opening in the lid
- B81C 2203/0154 . . Moulding a cap over the MEMS device
- B81C 2203/0163 . . Reinforcing a cap, e.g. with ribs
- B81C 2203/0172 . . Seals
- B81C 2203/0181 . . . Using micro-heaters for bonding the lid
- B81C 2203/019 . . . characterised by the material or arrangement of seals between parts
- B81C 2203/03 . Bonding two components
- B81C 2203/031 . . Anodic bondings
- B81C 2203/032 . . Gluing
- B81C 2203/033 . . Thermal bonding
- B81C 2203/035 . . . Soldering
- B81C 2203/036 . . . Fusion bonding
- B81C 2203/037 . . . Thermal bonding techniques not provided for in [B81C 2203/035](#) to [B81C 2203/036](#)
- B81C 2203/038 . . Bonding techniques not provided for in [B81C 2203/031](#) to [B81C 2203/037](#)
- B81C 2203/05 . Aligning components to be assembled
- B81C 2203/051 . . Active alignment, e.g. using internal or external actuators, magnets, sensors, marks or marks detectors
- B81C 2203/052 . . Passive alignment, i.e. using only structural arrangements or thermodynamic forces without an internal or external apparatus
- B81C 2203/054 . . . using structural alignment aids, e.g. spacers, interposers, male/female parts, rods or balls
- B81C 2203/055 . . . using the surface tension of fluid solder to align the elements
- B81C 2203/057 . . . Passive alignment techniques not provided for in [B81C 2203/054](#) to [B81C 2203/055](#)
- B81C 2203/058 . . Aligning components using methods not provided for in [B81C 2203/051](#) to [B81C 2203/052](#)
- B81C 2203/07 . Integrating an electronic processing unit with a micromechanical structure
- B81C 2203/0707 . . Monolithic integration, i.e. the electronic processing unit is formed on or in the same substrate as the micromechanical structure
- B81C 2203/0714 . . . Forming the micromechanical structure with a CMOS process

- B81C 2203/0721 . . . Forming the micromechanical structure with a low-temperature process  
([B81C 2203/0735](#) takes precedence)
- B81C 2203/0728 . . . Pre-CMOS, i.e. forming the micromechanical structure before the CMOS circuit
- B81C 2203/0735 . . . Post-CMOS, i.e. forming the micromechanical structure after the CMOS circuit
- B81C 2203/0742 . . . Interleave, i.e. simultaneously forming the micromechanical structure and the CMOS circuit
- B81C 2203/075 . . . the electronic processing unit being integrated into an element of the micromechanical structure
- B81C 2203/0757 . . . Topology for facilitating the monolithic integration
- B81C 2203/0764 . . . . Forming the micromechanical structure in a groove
- B81C 2203/0771 . . . . Stacking the electronic processing unit and the micromechanical structure
- B81C 2203/0778 . . . . Topology for facilitating the monolithic integration not provided for in  
[B81C 2203/0764](#) to [B81C 2203/0771](#)
- B81C 2203/0785 . . Transfer and join technology, i.e. forming the electronic processing unit and the micromechanical structure on separate substrates and joining the substrates
- B81C 2203/0792 . . . Forming interconnections between the electronic processing unit and the micromechanical structure
  
- B81C 2900/00** **Apparatus specially adapted for the manufacture or treatment of micro-structural devices or systems**
- B81C 2900/02 . Micro extrusion heads