H01M  PROCESSES OR MEANS, e.g. BATTERIES, FOR THE DIRECT CONVERSION OF CHEMICAL ENERGY INTO ELECTRICAL ENERGY

NOTE

This subclass covers galvanic primary or secondary cells or batteries, fuel cells or stacks.

WARNING

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.

2/00  Constructional details or processes of manufacture of the non-active parts
2/02  . . . Cases, jackets or wrappings
2/0202  . . . {for small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment (H01M 2/025 takes precedence)}
2/0205  . . . {Cases with a shape not covered by groups H01M 2/0207 - H01M 2/0235}
2/0207  . . . {Flat-shaped cells or batteries of flat cells (H01M 2/0222 takes precedence)}
2/021  . . . {with both terminals passing through the case or cover}
2/0212  . . . {with plate-like or sheet-like terminals (H01M 2/0215 takes precedence)}
2/0215  . . . {with window-like or sheet-like terminals}
2/0217  . . . {Cases of prismatic shape}
2/022  . . . {Cases of cylindrical or round shape}
2/0222  . . . {Button or coin cell cases}
2/0225  . . . {with cup-shaped terminals}
2/0227  . . . {with both cup-shaped terminals}
2/023  . . . {with one cup-shaped terminal}
2/0232  . . . . . {with a passing-through terminal (H01M 2/0235 takes precedence)}
2/0235  . . . . . {with a collector centrally disposed in the active mass, e.g. Leclanch cells}
2/0237  . . . . {for large-sized cells or batteries, e.g. starting, lighting or ignition [SLI] batteries, traction or motive power type or standby power batteries (H01M 2/025 takes precedence)}
2/024  . . . . . {Details}
2/0242  . . . . . {Monobloc manufactured cases comprising multiple compartments}
2/0245  . . . . . {Assembly of different cases, i.e. modular battery or cases particularly provided with means for assembling}
2/0247  . . . . . {sealed to each other in a non-detachable manner}
2/025  . . . . . {for cells or batteries working under specific conditions such as high temperature, gas diffusion, external electrolyte circulation, external supply of reactants}

2/0252  . . . {High-temperature cells or batteries, e.g. Na-S cells, Li-Cl cells}
2/0255  . . . {Hybrid cells or batteries (H01M 2/0222 takes precedence)}
2/0257  . . . {characterised by the material}
2/0259  . . . {characterised by the material}
2/026  . . . . . {for small-sized cells or batteries, batteries or cells for portable equipment}
2/0262  . . . . . {for large-sized cells or batteries, batteries or cells for traction or motive power or standby power}
2/0265  . . . . . {for high-temperature cells}
2/0267  . . . . . {of wrappings, outside coatings, jackets around completely closed cell elements}
2/027  . . . . . . {Casing material forming terminal of the cell}
2/0272  . . . . . . {characterized by the internal coating or internal conductive layer}
2/0275  . . . . . . {of flexible envelopes or bags around open cell elements}
2/0277  . . . . . . {Insulating material (H01M 2/029 takes precedence)}
2/028  . . . . . . {being one layer}
2/0282  . . . . . . {having particulate or reinforced material}
2/0285  . . . . . . {Conductive material}
2/0287  . . . . . . {comprising layers}
2/029  . . . . . . . {consisting only of insulating material}
2/0292  . . . . . . . {characterised by the external coating on the casing}
2/0295  . . . . . . . {Composite material consisting of mixed or dispersed phases}

2/0297  . . . . . . . . . . . {characterised by physical parameters}
2/04  . . . . Lids or covers
2/0404  . . . . . . {for small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment (H01M 2/0443 takes precedence)}
2/0408  . . . . . . {Crimp-sealed cells or batteries; Cells or batteries with turned-over edges}
2/0413  . . . . . . {provided with an intermediary sealing member between the crimped or curled edges (H01M 2/0417 takes precedence)}
Apparatus - H01M

2/1083 . . . . [Fixing on vehicles]
2/1088 . . . . [for accumulators working at high temperature]
2/1094 . . . [Particular characteristics of materials used to isolate the battery from its environment, e.g. thermal insulation, corrosion resistance, pressure resistance, electrolyte leakage]
2/12 . . . . . . [Vent plugs or other mechanical arrangements for facilitating escape of gases]
2/1205 . . . . [Vent arrangements incorporated in vent plugs or multiplug systems detachable from the battery or cell]
2/1211 . . . . [Multiplug systems or arrangements; Plurality of plugs surrounded by a common cover]
2/1217 . . . . [in the shape of a one-piece member]
2/1223 . . . . [Vent arrangements of resellable design (H01M 2/1205, H01M 2/1247-H01M 2/1294 take precedence)]
2/1229 . . . . [comprising a deformable, elastic or flexible valve member]
2/1235 . . . . [Emergency or safety arrangements of non-resellable design (H01M 2/1205, H01M 2/1247-H01M 2/1294 take precedence)]
2/1241 . . . . [in the form of rupturable membranes or weakened parts, e.g. pierced with the aid of a sharp member]
2/1247 . . . . [Explosion- or splash-preventing means contained in the head space of the battery, e.g. means floating on the electrolyte]
2/1252 . . . . [comprising elongated, tortuous or labyrinth-shaped exhaust passages in the battery cover or case; Double cover vent systems]
2/1258 . . . . [containing electrolyte neutralising or absorbing means]
2/1264 . . . . [comprising gas-pervious parts or elements]
2/127 . . . . . . [as flame arrester or ignition preventing means]
2/1276 . . . . [Spring-loaded vent valves]
2/1282 . . . . [Thermally responsive or sensitive vent means]
2/1288 . . . . [Film- or sheet-like elastic valve members optionally coated with non-drying glue]
2/1294 . . . . [Slit, perforated or punctured elastic valve members]
2/14 . . . . . . [Separators; Membranes; Diaphragms; Spacing elements]
2/145 . . . . [Manufacturing processes]
2/16 . . . . . . [characterised by the material]
2/1606 . . . . [comprising fibrous material]
2/1613 . . . . [Inorganic fibrous material]
2/162 . . . . . . [Organic fibrous material]
2/1626 . . . . . . [Natural fibres, e.g. cotton, cellulose]
2/1633 . . . . . . [Mixtures of inorganic and organic fibres]
2/164 . . . . . . [comprising non-fibrous material (H01M 2/1606 takes precedence)]
2/1646 . . . . . . [Inorganic non-fibrous material]
2/1653 . . . . . . [Organic non-fibrous material]
2/166 . . . . . . [Mixtures of inorganic and organic non-fibrous material]
2/1666 . . . . . . [comprising a non-fibrous layer and a fibrous layer superimposed on one another]
2/1673 . . . . . . [Electrode-separator combination]
2/168 . . . . . . [with adhesive layers between electrodes and separators]
Electrodes

Electrodes composed of or comprising active material

Methods of deposition of the material

Involving impregnation with a solution, dispersion, paste or dry powder

Involving spraying

Involving vapour deposition

Physical vapour deposition

Involving compressing or compaction

Molding

Rolling or calendering

Physical vapour deposition

Physical deposition

by coating on an electrolyte layer

by a doctor blade method, slip-casting or roller coating

by extrusion

by screen printing

by electrochemical processing (electroless electrochemical plating C23C 18/54)

Activating, forming or electrochemical attack of the supporting material

Anodisation, Oxidation (electrolytic coating by anodisation C25D 9/00)

Forming after manufacture of the electrode, e.g. first charge, cycling

(of complete cells or cells stacks)

Electrochemical coating; Electrochemical impregnation

(from solutions)

(from melts)

(from dispersions or suspensions; Electrophoresis)

Electrochemical doping, intercalation, occlusion or alloying

Electrochemical alloying

Terminals

2/28 . . . for lead-acid accumulators

2/30 . . . Terminals

2/302 . . . (Terminal post members on carbon electrodes; Machines or processes for applying said terminal post members, e.g. capping of carbon rods)

2/305 . . . (Poles or terminals for starting, lighting or ignition [SLI] batteries, traction or motive power type or standby power batteries)

2/32 . . . Methods or arrangements for affording protection against corrosion; Selection of materials therefor

2/34 . . . with provision for preventing undesired use or discharge (e.g. complete cut of current (safety devices H01M 22000/00))

2/341 . . . [Anti-theft provisions]

2/342 . . . [Protection against polarity reversal]

2/344 . . . [Guarantee labels or covers]

2/345 . . . [in response to pressure]

2/347 . . . [in response to shock]

2/348 . . . [in response to temperature]

2/36 . . . Arrangements for filling, topping-up or emptying cases with or of liquid, e.g. for filling with electrolytes, for washing-out

2/361 . . . [Filling of small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment]

2/362 . . . [Filling or topping up of large-sized cells or batteries, e.g. starting, lighting or ignition [SLI] batteries, traction or motive power type or standby power batteries]

2/364 . . . [Removing or drainage of electrolyte; Cleaning battery or cell cases]
4/0464 . . . . . [Electro organic synthesis] 4/0466 . . . . . [Electrochemical polymerisation] 4/0469 . . . . . [Electroforming a self-supporting electrode; Electroforming of powdered electrode material] 4/0471 . . . . . [involving thermal treatment, e.g. firing, sintering, backing particulate active material, thermal decomposition, pyrolysis] 4/0473 . . . . . [Filling tube-or pockets type electrodes; Applying active mass in cup-shaped terminals] 4/0476 . . . . . [with molten material] 4/0478 . . . . . [with dispersions, suspensions or pastes] 4/048 . . . . . [with dry powder] 4/0483 . . . . . [by methods including the handling of a melt (H01M 4/0438, take precedence)] 4/0485 . . . . . [Casting] 4/0488 . . . . . [Alloying] 4/049 . . . . . [Manufacturing of an active layer by chemical means] 4/0492 . . . . . [Chemical attack of the support material] 4/0495 . . . . . [Chemical alloying] 4/0497 . . . . . [Chemical precipitation] 4/06 . . . . . Electrodes for primary cells 4/08 . . . . . Processes of manufacture 4/10 . . . . . of pressed electrodes with central core, i.e. dollies 4/12 . . . . . of consumable metal or alloy electrodes (use of alloy compositions as active materials H01M 4/38) 4/13 . . . . . Electrodes for accumulators with non-aqueous electrolyte, e.g. for lithium-accumulators; Processes of manufacture thereof

**NOTE:**
This group does not cover electrodes for accumulators working at high temperatures, e.g. molten sodium electrodes, which subject matter is classified in group H01M 10/39

4/131 . . . . . Electrodes based on mixed oxides or hydroxides, or on mixtures of oxides or hydroxides, e.g. LiCoOx 4/1315 . . . . . containing halogen atoms, e.g. LiCoOxFy 4/133 . . . . . Electrodes based on carbonate material, e.g. graphite-intercalation compounds or CFx 4/134 . . . . . Electrodes based on metals, Si or alloys 4/136 . . . . . Electrodes based on inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoFy 4/137 . . . . . Electrodes based on electro-active polymers 4/139 . . . . . Processes of manufacture 4/1391 . . . . . of electrodes based on mixed oxides or hydroxides, or on mixtures of oxides or hydroxides, e.g. LiCoOx 4/13915 . . . . . containing halogen atoms, e.g. LiCoOxFy 4/1393 . . . . . Electrodes based on carbonate material, e.g. graphite-intercalation compounds or CFx 4/1395 . . . . . of electrodes based on metals, Si or alloys 4/1397 . . . . . Electrodes based on inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoFy 4/1399 . . . . . of electrodes based on electro-active polymers 4/14 . . . . . Electrodes for lead-acid accumulators 4/16 . . . . . Processes of manufacture 4/18 . . . . . of Planté electrodes 4/20 . . . . . of pasted electrodes 4/21 . . . . . Drying of pasted electrodes 4/22 . . . . . Forming of electrodes 4/23 . . . . . Drying or preserving electrodes after forming 4/24 . . . . . Electrodes for alkaline accumulators 4/242 . . . . . [Hydrogen storage electrodes] 4/244 . . . . . [Zinc electrodes] 4/246 . . . . . [Cadmium electrodes] 4/248 . . . . . [Iron electrodes] 4/26 . . . . . Processes of manufacture 4/28 . . . . . Precipitating active material on the carrier 4/29 . . . . . by electrochemical methods 4/30 . . . . . Pressing 4/32 . . . . . Nickel oxide or hydroxide electrodes 4/34 . . . . . Silver oxide or hydroxide electrodes 4/36 . . . . . Selection of substances as active materials, active masses, active liquids (electrode materials of hybrid or double layer capacitors H01G 11/30-H01G 11/50) 4/362 . . . . . [Composites] 4/364 . . . . . [as mixtures] 4/366 . . . . . [as layered products] 4/368 . . . . . [Liquid depolarisers] 4/38 . . . . . of elements or alloys 4/381 . . . . . [Alkaline or alkaline earth metals elements (H01M 4/40 takes precedence)] 4/382 . . . . . [Lithium (H01M 4/405 takes precedence)] 4/383 . . . . . [Hydrogen absorbing alloys] 4/385 . . . . . [of the type LaNi5] 4/386 . . . . . [Silicon or alloys based on silicon] 4/387 . . . . . [Tin or alloys based on tin] 4/388 . . . . . [Halogens] 4/40 . . . . . Alloys based on alkali metals 4/405 . . . . . [Alloys based on lithium] 4/42 . . . . . Alloys based on zinc 4/44 . . . . . Alloys based on cadmium 4/46 . . . . . Alloys based on magnesium or aluminium 4/463 . . . . . [Aluminium based] 4/466 . . . . . [Magnesium based] 4/48 . . . . . of inorganic oxides or hydroxides 4/481 . . . . . [of mercury] 4/483 . . . . . [for non-aqueous cells (H01M 4/485 takes precedence)] 4/485 . . . . . of mixed oxides or hydroxides for inserting or intercalating light metals, e.g. LiTi2O4 or LiTi2OxFy (H01M 4/505, H01M 4/525 take precedence) 4/50 . . . . . of manganese 4/502 . . . . . [for non-aqueous cells (H01M 4/505 takes precedence)] 4/505 . . . . . of mixed oxides or hydroxides containing manganese for inserting or intercalating light metals, e.g. LiMn2O4 or LiMn2OxFy 4/52 . . . . . of nickel, cobalt or iron 4/521 . . . . . [of iron for aqueous cells] 4/523 . . . . . [for non-aqueous cells (H01M 4/525 takes precedence)]
of mixed oxides or hydroxides containing iron, cobalt or nickel for inserting or intercalating light metals, e.g. LiNiO₂, LiCoO₂ or LiCoOₓFᵧ

of silver

of lead

of “grey lead”, i.e. powders containing lead and lead oxide

of inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoOₓFᵧ; of polyanionic structures, e.g. phosphates, silicates or borates

[Phosphides]

[Chalcogenides or intercalation compounds thereof]

[Sulfides]

[Halogenides]

[Oxygenated metallic slats or polyanionic structures, e.g. borates, phosphates, silicates, olivines]

NOTE

Polyanionic structures comprises elements not changing oxidation state during electrochemical reaction, e.g. P, Si, B

Carbonaceous material, e.g. graphite-intercalation compounds or CFₓ

[Comprising fluorine or fluoride salts]

for inserting or intercalating light metals

of organic compounds

[Polymer(s)]

[ containing aliphatic main chain polymers]

[ containing aromatic main chain polymers]

[ containing heterocyclic rings]

Selection of inactive substances as ingredients for active masses, e.g. binders, fillers

[Binders]

[ being polymers]

[ fluorinated polymers]

[ Electric conductive fillers]

[ Carbon or graphite]

[ Metals]

[ Expanders for lead-acid accumulators]

[ Inhibitors, e.g. gassing inhibitors, corrosion inhibitors]

Carriers or collectors (current collector for hybrid or electric double layer capacitors [H01G 11/66])

Selection of materials

[Metal or alloys, e.g. alloy coatings [H01M 4/669 take precedence]]

[Alloys (collectors of lead alloys H01M 4/685)]

[ containing carbon or carbonaceous materials as conductive part, e.g. graphite, carbon fibres]

[Ceramic materials]

[Composites]

[in the form of mixed materials (H01M 4/668 takes precedence)]

[in the form of layers, e.g. coatings]

[Composites of electroconductive material and synthetic resins]

[Steels]

for use in lead-acid accumulators

[Lead alloys]

characterised by shape or form

[Grids]

for lead-acid accumulators, e.g. frame plates

Meshes or woven material; Expanded metal

[perforated material]

[Expanded metal]

[Woven material]

Wires, rods or strips

Containers for holding the active material, e.g. tubes, capsules

[Porous or perforated metallic containers]

[Tubular type or pencil type electrodes; tubular or multitudinal sheaths or covers of insulating material for said tubular-type electrodes]

[Multitudinal sheaths or covers]

Shapes other than plane or cylindrical, e.g. helical

[Porous plates, e.g. sintered carriers]

[Sintered carriers]

[of only powdered material]

[of powdered and fibrous material]

[Nonwoven fibrous fabric containing only fibres]

[Foamed, spongy materials]

Multi-step processes for manufacturing carriers for lead-acid accumulators

 involving casting

Inert electrodes with catalytic activity, e.g. for fuel cells

[Porous electrodes]

[with a gradient in the porosity]

[Bifunctional electrodes for rechargeable cells]

[containing only metallic or ceramic material, e.g. made by sintering or sputtering]

[characterised by the form]

[Bipolar electrodes]

[with a gradient in another property than porosity (H01M 4/861 takes precedence)]

[Gradient in composition]

[consisting of more than one material, e.g. consisting of composites]

[as mixture]

[ layered]

[Selection of inactive substances as ingredients for catalytic active masses, e.g. binders, fillers]

[binders]

[Electrically conductive fillers]

[characterised by the polarity]

[Negative electrodes]

[Positive electrodes]

[Bipolar electrodes]

Processes of manufacture
Selection of catalytic material

NOTE
In this group, primary cells are electrochemical generators in which the cell energy is present in chemical form and is not regenerated.

6/00 Primary cells; Manufacture thereof

6/005 {Devices for making primary cells}
6/01 {Details of non-active parts (H01M 2/00: of electrodes H01M 4/00)}
6/03 {Cells with aqueous electrolyte}
6/045 {characterised by aqueous electrolyte}
6/06 {Dry cells, i.e. cells wherein the electrolyte is rendered non-fluid}
6/08 {with cup shaped electrodes}
6/085 {of the reversed type, i.e. anode in the centre}
6/10 {with wound or folded electrodes}
6/103 {Cells with electrode of only one polarity being folded or wound}

2006/106 {Elliptic wound cells}
6/12 {with flat electrodes}
6/14 {Cells with non-aqueous electrolyte ((H01M 10/05 takes precedence)}
6/145 {containing ammonia}
6/16 {with organic electrolyte (H01M 6/18, (H01M 10/05 take precedence)}
6/162 {characterised by the electrolyte}
6/164 {by the solvent (organic electrolyte solvents H01M 2300/0028)}
6/166 {by the solute}
6/168 {by additives}
6/18 {with solid electrolyte}
6/181 {with polymeric electrolytes (organic polymers electrolytes H01M 2300/0082)}
6/182 {with halogenide as solid electrolyte (halide solid electrolytes H01M 2300/0088)}
6/183 {with fluoride as solid electrolyte}
6/185 {with oxides, hydroxides or oxysalts as solid electrolytes (oxides solid electrolyte H01M 2300/0071)}
6/186 {Only oxysalts-containing solid electrolytes}
Fuel cells; Manufacture thereof

NOTE

Fuel cells are electrochemical generators wherein the reactants are supplied from outside
8/0265 . . . the reactant or coolant channels having varying cross sections
8/0267 . . . having heating or cooling means, e.g. heaters or coolant flow channels

**WARNING**

Group H01M 8/0267 is impacted by recategorisation into groups H01M 8/0258 - H01M 8/0265 and H01M 8/2483.

Groups H01M 8/0267 should be considered when searching any group in the range H01M 8/0258 - H01M 8/0265 or group H01M 8/2483.

8/0269 . . . [Separators, collectors or interconnectors including a printed circuit board]
8/0271 . . . Sealing or supporting means around electrodes, matrices or membranes

**WARNING**

Group H01M 8/0271 is incomplete pending recategorisation of documents from group H01M 8/0297.

Group H01M 8/0297 and H01M 8/0271 should be considered in order to perform a complete search.

8/0273 . . . with sealing or supporting means in the form of a frame

**WARNING**

Group H01M 8/0273 is incomplete pending recategorisation of documents from group H01M 8/0276.

Group H01M 8/0276 and H01M 8/0273 should be considered in order to perform a complete search.

8/0276 . . . Sealing means characterised by their form (H01M 8/0273 takes precedence)

**WARNING**

Group H01M 8/0276 is impacted by recategorisation into group H01M 8/0273.

Groups H01M 8/0276 and H01M 8/0273 should be considered in order to perform a complete search.

8/0278 . . . {O-rings}
8/028 . . . Sealing means characterised by their material
8/0282 . . . Inorganic material
8/0284 . . . Organic resins; Organic polymers
8/0286 . . . Processes for forming seals
8/0289 . . . Means for holding the electrolyte (solid polymer electrolytes H01M 8/1018)
8/0293 . . . Matrices for immobilising electrolyte solutions
8/0295 . . . Matrices for immobilising electrolyte melts

8/0297 . . . Arrangements for joining electrodes, reservoir layers, heat exchange units or bipolar separators to each other (H01M 8/0271 takes precedence)

**WARNING**

Group H01M 8/0297 is impacted by recategorisation into groups H01M 8/0271.

Groups H01M 8/0297 and H01M 8/0271 should be considered in order to perform a complete search.

8/04 . . . Auxiliary arrangements, e.g. for control of pressure or for circulation of fluids

**NOTE**

In this group, multi-aspect classification is applied, so that subject matter characterised by aspects covered by more than one of its subgroups should be classified in each of those subgroups.

8/04007 . . . related to heat exchange
8/04014 . . . Heat exchange using gaseous fluids; Heat exchange by combustion of reactants
8/04022 . . . [Heating by combustion]
8/04029 . . . Heat exchange using liquids
8/04037 . . . [Electrical heating]
8/04044 . . . Purification of heat exchange media
8/04052 . . . [Storage of heat in the fuel cell system]
8/04059 . . . [Evaporative processes for the cooling of a fuel cell]
8/04067 . . . [Heat exchange or temperature measuring elements, thermal insulation, e.g. heat pipes, heat pumps, fins]
8/04074 . . . [Heat exchange unit structures specially adapted for fuel cell (heat exchanger for fuel cells F28D 2021/0043)]
8/04082 . . . Arrangements for control of reactant parameters, e.g. pressure or concentration
8/04089 . . . of gaseous reactants
8/04097 . . . {with recycling of the reactants (H01M 8/04119, H01M 8/04104 take precedence)}
8/04104 . . . [Regulation of differential pressures]
8/04111 . . . using a compressor turbine assembly
8/04119 . . . with simultaneous supply or evacuation of electrolyte; Humidifying or dehumidifying
8/04126 . . . [Humidifying]
8/04134 . . . [by coolants]
8/04141 . . . [by water containing exhaust gases]
8/04149 . . . [by diffusion, e.g. making use of membranes]
8/04156 . . . [with product water removal]
8/04164 . . . [by condensers, gas-liquid separators or filters]
8/04171 . . . [using adsorbents, wicks or hydrophilic material]
8/04179 . . . [by purging or increasing flow or pressure of reactants]
8/04186 . . . of liquid-charged or electrolyte-charged reactants
8/04194 . . . [Concentration measuring cells]
8/04197 . . . [Preventing means for fuel crossover]
8/04201 . . . [Reactant storage and supply, e.g. means for feeding, pipes]
Processes for controlling fuel cells or fuel cell systems (H01M 8/04119)

Arrangements for managing water in solid stream, e.g. heat exchange

Arrangements for managing the electrolyte

is impacted by should be considered

- H01M 8/04228
- H01M 8/04303

WARNING

Group H01M 8/04223 is impacted by reclassification into groups groups H01M 8/04225-H01M 8/04228 and H01M 8/043-H01M 8/04303.

Groups H01M 8/04223 should be considered when searching any group of the ranges H01M 8/04225 - H01M 8/04228 and H01M 8/043-H01M 8/04303 in order to perform a complete search.

WARNING

Groups H01M 8/04225-H01M 8/04228 are incomplete pending reclassification of documents from group H01M 8/04223.

Group H01M 8/04223 should be considered when searching any group of the range H01M 8/04225-H01M 8/04228 in order to perform a complete search.

during shut-down

[Purging of the reactants]

[Depolarisation]

[Short circuiting means for defective fuel cells (detection of defective fuel cells H01M 8/04664, methods for shorting fuel cells H01M 8/04955)]

[Means for solving freezing problems]

[Heating of fuel cells during the start-up of the fuel cells]

Arrangements for managing the electrolyte stream, e.g. heat exchange

[Supply means of electrolyte to or in matrix-fuel cells]

Arrangements for managing water in solid electrolyte fuel cell systems (H01M 8/04119 takes precedence)

Processes for controlling fuel cells or fuel cell systems applied during specific periods

WARNING

Groups H01M 8/043 - H01M 8/04303 are incomplete pending reclassification of documents from group H01M 8/04223.

Group H01M 8/04223 should be considered any group of the range H01M 8/043-H01M 8/04303 in order to perform a complete search.

applied during start-up

applied during shut-down

[Modeling, demonstration models of fuel cells, e.g. for training purposes]

characterised by the detection or assessment of variables; characterised by the detection or assessment of failure or abnormal function

Temperature; Ambient temperature

[of anode reactants at the inlet or inside the fuel cell]

[of cathode reactants at the inlet or inside the fuel cell]

[of anode exhausts]

[of cathode exhausts]

[of the coolant]

[of other components of a fuel cell or fuel cell stacks]

[of auxiliary devices, e.g. reformers, compressors, burners]

[Pressure; Ambient pressure; Flow]

[of anode reactants at the inlet or inside the fuel cell]

[of anode reactants at the inlet or inside the fuel cell]

[Power, energy, capacity or load]

[of the individual fuel cell]

[of fuel cell stacks]

[of auxiliary devices, e.g. batteries, capacitors]

[of the individual fuel cell]

[of fuel cell stacks]

[of auxiliary devices, e.g. batteries, capacitors]

[Other electric variables, e.g. resistance or impedance]
networks or artificial intelligence e.g. feedback control loops, fuzzy logic, neural mathematical or computational algorithms, characterised by the implementation of
Shut-off or shut-down of fuel cells
capacitors
Pressure; Flow
[MEA] (characterised by membrane-electrode assemblies
of auxiliary devices, e.g. reformer, compressor, burner)

Concentration; Density (characterised by the electrolyte material
takes precedence)

Pressure differences, e.g. between anode and cathode)

Chemical structure of the main chain of the ion-conducting polymer

NOTE
When classifying in this group, structures having two or more heteroatoms belonging to the groups O, P, N, S or Si must be completely identified by classification in all relevant subgroups.

having only carbon, e.g. polyanlyenes, polystyrenes or polybutadiene-styrenes
having only carbon and oxygen, e.g. polyethers, sulfonated polyetheretherketones [S-PEEK], sulfonated polysaccharides, sulfonated celluloses or sulfonated polyesters

having carbon, oxygen and other atoms, e.g. sulfonated polyethersulfones [S-PES]

having nitrogen, e.g. sulfonated polybenzimidazoles [S-PBI], polybenzimidazoles with phosphoric acid, sulfonated polyamides [S-PA] or sulfonated polyphosphazenes [S-PPh]

having sulfur, e.g. sulfonated-polyethersulfones [S-PES]

having phosphorus, e.g. sulfonated polyphosphazenes [S-PPh]

having silicon, e.g. sulfonated crosslinked polymethylsiloxanes

halogenated, e.g. sulfonated polyvinylidene fluorides

Polymer electrolyte composites, mixtures or blends

Mixtures of polymers, of which at least one is ionically conductive

Mixtures of at least one polymer and at least one additive

Ion-conducting additives, e.g. ion-conducting particles, heteropolyacids, metal phosphate or polybenzimidazole with phosphoric acid

Non-ion-conducting additives, e.g. stabilisers, SiO$_2$ or ZrO$_2$

consisting of layers of polymers with at least one layer being ionically conductive

{Inorganic layers on the polymer electrolytes, e.g. inorganic coatings}

characterised by a porous support having no ion-conducting properties

characterised by the chemical composition of the porous support

characterised by the physical properties of the porous support, e.g. its porosity or thickness

characterised by the form, e.g. perforated or wave-shaped

characterised by their physical properties, e.g. porosity, ionic conductivity or thickness

characterised by the manufacturing processes

by chemical reactions, e.g. in situ polymerisation or in situ crosslinking

{Sol-gel processes}

{Micromachining techniques, e.g. masking, etching steps or photolithography}

{Inducing porosity into non porous precursors membranes, e.g. leaching, pore stretching}

starting from solutions, dispersions or slurries exclusively of polymers

{Starting from polymer melts other than monomer melts}

After-treatment of the membrane other than by polymerisation

Chemical modification, e.g. sulfonation

[thermal other than drying, e.g. sintering]

[mechanical, e.g. pressing, puncturing]

{Fuel cells with polymeric electrolytes}

Fuel cells applied on a support, e.g. miniature fuel cells deposited on silica supports

operating at high temperature, e.g. with stabilised ZrO$_2$ electrolyte

characterised by the electrode/electrolyte combination or the supporting material

Corrugated, curved or wave-shaped MEA

characterised by the supporting layer

with both reactants being gaseous or vapourised

with one of the reactants being liquid, solid or liquid-charged

characterised by the process of manufacturing or by the material of the electrolyte

the electrolyte consisting of oxides

the electrolyte containing zirconium oxide

the electrolyte containing cerium oxide

{The electrolyte containing bismuth oxide}

{Fuel cells with solid halide electrolytes (solid halide electrolyte H01M 2300/008)}

{Fuel cells with solid halide electrolytes (solid halide electrolyte H01M 2300/008)}

Fuel cells applied on a support, e.g. miniature fuel cells deposited on silica supports

{Fuel cells with solid oxide electrolytes}

Fuel cells with fused electrolytes

{the anode and the cathode being gas-permeable electrodes or electrode layers}

{with matrix-supported or semi-solid matrix-reinforced electrolyte}

{with liquid, solid or electrolyte-charged reactants}

{characterised by the electrolyte material}

{comprising carbonates}

{Fuel cells with molten hydroxide (molten hydroxide electrolyte H01M 2300/006)}

{Fuel cells with molten carbonates}

{Measures, other than selecting a specific electrode material, to reduce electrode dissolution}

Biochemical fuel cells, i.e. cells in which microorganisms function as catalysts

Regenerative fuel cells, e.g. redox flow batteries or secondary fuel cells

{Regeneration by thermal means}

{Regeneration by electrochemical means}

{by electrolytic decomposition of the electrolytic solution or the formed water product}

{by recharging of redox couples containing fluids; Redox flow type batteries}

Indirect fuel cells, e.g. fuel cells with redox couple being irreversible (H01M 8/18 takes precedence)

Fuel cells in which the fuel is based on materials comprising carbon or oxygen or hydrogen and other elements; Fuel cells in which the fuel is based on materials comprising only elements other than carbon, oxygen or hydrogen
8/222 . . . [Fuel cells in which the fuel is based on compounds containing nitrogen, e.g. hydrazine, ammonia]

8/225 . . . [Fuel cells in which the fuel is based on materials comprising particulate active material in the form of a suspension, a dispersion, a fluidised bed or a paste]

8/227 . . . [Dialytic cells or batteries; Reverse electrodialysis cells or batteries]

8/24 . . . Grouping of fuel cells, e.g. stacking of fuel cells

**WARNING**

Group H01M 8/24 is impacted by reclassification into group H01M 8/2404. Groups H01M 8/24 and H01M 8/2404 should be considered in order to perform a complete search.

8/2404 . . . Processes or apparatus for grouping fuel cells

**WARNING**

Group H01M 8/2404 is incomplete pending reclassification of documents from groups H01M 8/24, H01M 8/241, H01M 8/242, H01M 8/2425, H01M 8/243, H01M 8/2435, H01M 8/244, H01M 8/245 and H01M 8/246. All groups listed in this warning should be considered when searching H01M 8/2404 to perform a complete search.

8/2405 . . . (Frozen)

{comprising spaced diffusion electrodes or electrode layers with interposed electrolyte layer or electrolyte compartment}

**WARNING**

Group H01M 8/2405 is no longer used for the classification of documents as of February 1, 2016. The content of this group is being reclassified into groups H01M 8/2457 and H01M 8/2459.

Group H01M 8/2405 should be considered when searching group H01M 8/2457 or H01M 8/2459 in order to perform a complete search.

8/241 . . . with solid or matrix-supported electrolytes

**WARNING**

Group H01M 8/241 is impacted by reclassification into groups H01M 8/2404 and H01M 8/2418. Groups H01M 8/241 should be considered when searching group H01M 8/2404 or group H01M 8/2418 in order to perform a complete search.

8/2415 . . . (Frozen)

{External manif oled battery stock}

**WARNING**

Group H01M 8/2415 is no longer used for the classification of documents as of February 1, 2016. The content of this group is being reclassified into groups H01M 8/2484 and H01M 8/2485.

Groups H01M 8/2415 should be considered when searching group H01M 8/2484 or H01M 8/2485 in order to perform a complete search.

8/2418 . . . Grouping by arranging unit cells in a plane (H01M 8/2425, H01M 8/244 take precedence)

**WARNING**

Group H01M 8/2418 is incomplete pending reclassification of documents from group H01M 8/241. Group H01M 8/241 and H01M 8/2418 should be considered in order to perform a complete search.

8/242 . . . comprising framed electrodes or intermediary frame-like gaskets (H01M 8/2425, H01M 8/244 take precedence)

**WARNING**

Group H01M 8/242 is incomplete pending reclassification of documents from groups H01M 8/245 and H01M 8/246, and impacted by reclassification into groups H01M 8/2404.

Groups H01M 8/242, H01M 8/245, H01M 8/245, and H01M 8/246 should be considered in order to perform a complete search.

8/2425 . . . High-temperature cells with solid electrolytes

**WARNING**

Group H01M 8/2425 is incomplete pending reclassification of documents from group H01M 8/245 and H01M 8/246, and impacted by reclassification into groups H01M 8/2428, H01M 8/2432 and H01M 8/2404.

Groups H01M 8/2425, H01M 8/2428, H01M 8/2432, H01M 8/2404, H01M 8/245 and H01M 8/246 should be considered in order to perform a complete search.

8/2428 . . . Grouping by arranging unit cells on a surface of any form, e.g. planar or tubular

**WARNING**

Group H01M 8/2428 is incomplete pending reclassification of documents from groups H01M 8/2423, H01M 8/245 and H01M 8/246.

Groups H01M 8/2425, H01M 8/245, H01M 8/246, and H01M 8/2428 should be considered in order to perform a complete search.
Grouping of unit cells of tubular or cylindrical configuration

**WARNING**

Group H01M 8/243 is impacted by reclassification into group H01M 8/2404. Groups H01M 8/243 and H01M 8/2404 should be considered in order to perform a complete search.

Grouping of unit cells of planar configuration

**WARNING**

Group H01M 8/2432 is incomplete pending reclassification of documents from groups H01M 8/2425, H01M 8/245 and H01M 8/246. Groups H01M 8/2425, H01M 8/245, H01M 8/246 and H01M 8/2432 should be considered in order to perform a complete search.

**WARNING**

Group H01M 8/243 is impacted by reclassification into group H01M 8/2404. Groups H01M 8/243 and H01M 8/2404 should be considered in order to perform a complete search.

Grouping of unit cells of monolithic core structure, e.g. honeycombs

**WARNING**

Group H01M 8/2435 is impacted by reclassification into group H01M 8/2404. Groups H01M 8/2435 and H01M 8/2404 should be considered in order to perform a complete search.

Grouping of unit cells of matrix-supported molten electrolyte

**WARNING**

Group H01M 8/244 is impacted by reclassification into group H01M 8/2404. Groups H01M 8/244 and H01M 8/2404 should be considered in order to perform a complete search.

Grouping of unit cells of matrix-supported molten electrolyte with spaced diffusion electrodes or electrode layers with interposed electrolyte compartment with possible electrolyte supply or circulation

**WARNING**

Group H01M 8/2445 is no longer used for the classification of documents as of February 1, 2016. The content of this group is being reclassified into groups H01M 8/244 and H01M 8/2459. Groups H01M 8/2445 should be considered when searching group H01M 8/244 or H01M 8/2459 in order to perform a complete search.

Grouping of unit cells of monolithic core structure, e.g. honeycombs

**WARNING**

Group H01M 8/245 is impacted by reclassification into group H01M 8/2404. Groups H01M 8/245 and H01M 8/2404 should be considered in order to perform a complete search.

Grouping of unit cells of matrix-supported molten electrolyte with liquid, solid or electrolyte-charged reactants

**WARNING**

Group H01M 8/2455 is no longer used for the classification of documents as of February 1, 2016. The content of this group is being reclassified into groups H01M 8/244 and H01M 8/2404.

Groups H01M 8/2445, H01M 8/2405 and H01M 8/246 should be considered when searching any of the listed groups of this warning in order to perform a complete search.

Grouping of unit cells of matrix-supported molten electrolyte with both reactants being gaseous or vaporised

**WARNING**

Group H01M 8/2457 is incomplete pending reclassification of documents from groups H01M 8/2405 and H01M 8/2445. Groups H01M 8/2405, H01M 8/2445 and H01M 8/2457 should be considered in order to perform a complete search.

Grouping of unit cells of matrix-supported molten electrolyte with liquid, solid or electrolyte-charged reactants with framed electrodes or intermediary frame-like gaskets

**WARNING**

Group H01M 8/2459 is no longer used for the classification of documents as of February 1, 2016. The content of this group is being reclassified into groups H01M 8/2404, H01M 8/2425 and H01M 8/2428.

Groups H01M 8/245, H01M 8/2425, H01M 8/246 and H01M 8/2432 should be considered when searching any of the listed groups of this warning in order to perform a complete search.

Grouping of unit cells of monolithic core structure, e.g. honeycombs

**WARNING**

Group H01M 8/246 is impacted by reclassification into group H01M 8/2404. Groups H01M 8/246 and H01M 8/2404 should be considered in order to perform a complete search.

Grouping of unit cells of matrix-supported molten electrolyte with liquid, solid or electrolyte-charged reactants with framed electrodes or intermediary frame-like gaskets

**WARNING**

Group H01M 8/2465 is no longer used for the classification of documents as of February 1, 2016. The content of this group is being reclassified into groups H01M 8/244 and H01M 8/2483.

Groups H01M 8/2465 and H01M 8/2483 should be considered in order to perform a complete search.

Grouping of unit cells of monolithic core structure, e.g. honeycombs

**WARNING**

Group H01M 8/247 is impacted by reclassification into group H01M 8/2483. Groups H01M 8/2465 and H01M 8/2483 should be considered in order to perform a complete search.

Grouping of unit cells of monolithic core structure, e.g. honeycombs

**WARNING**

Group H01M 8/248 is impacted by reclassification into group H01M 8/2483. Groups H01M 8/2465 and H01M 8/2483 should be considered in order to perform a complete search.

Grouping of unit cells of monolithic core structure, e.g. honeycombs

**WARNING**

Group H01M 8/2485 is impacted by reclassification into group H01M 8/2483. Groups H01M 8/2465 and H01M 8/2483 should be considered in order to perform a complete search.

Grouping of unit cells of monolithic core structure, e.g. honeycombs

**WARNING**

Group H01M 8/2487 is impacted by reclassification into group H01M 8/2483. Groups H01M 8/2465 and H01M 8/2483 should be considered in order to perform a complete search.

Grouping of unit cells of monolithic core structure, e.g. honeycombs

**WARNING**

Group H01M 8/2489 is impacted by reclassification into group H01M 8/2483. Groups H01M 8/2465 and H01M 8/2483 should be considered in order to perform a complete search.
Secondary cells; Manufacture thereof

NOTE
Secondary cells are accumulators receiving and supplying electrical energy by means of reversible electrochemical reactions.

10/02 . . . . Details (of non-active parts H01M 2/00; of electrodes H01M 4/00)
10/04 . . . . Construction or manufacture in general (H01M 10/058, H01M 10/12, H01M 10/28, H01M 10/38 take precedence)

WARNING
Group H01M 10/04 is impacted by reclassification into group H01M 10/058.
Groups H01M 10/04 and H01M 10/058 should be considered in order to perform a complete search.

10/04 . . . . [Machines for assembling batteries]
10/04 . . . . [for cells with wound electrodes]
10/04 . . . . [Large-sized flat cells or batteries for motive or stationary systems with plate-like electrodes]
10/04 . . . . [with bipolar electrodes]
10/04 . . . . [Cells or battery with cylindrical casing]
10/06 . Lead-acid accumulators (semi-lead accumulators H01M 10/20)
10/08 . Selection of materials as electrolytes
10/10 . Immobilising of electrolyte
10/12 . Construction or manufacture
10/121 . [Valve regulated lead acid batteries [VRLA]]
10/122 . [Multimode batteries]
10/123 . [Cells or batteries with cylindrical casing]
10/124 . [Button cells]
10/125 . [Cells or batteries with wound or folded electrodes]
10/126 . [Small-sized flat cells or batteries for portable equipment (H01M 10/123 and H01M 10/125 take precedence)]
10/127 . [with bipolar electrodes]
10/128 . [Processes for forming or storing electrodes in the battery container]
10/14 . Assembling a group of electrodes or separators
10/16 . Suspending or supporting electrodes or groups of electrodes in the case
10/18 . with bipolar electrodes
10/20 . Semi-lead accumulators, i.e. accumulators in which only one electrode contains lead
10/22 . Selection of materials as electrolytes
10/24 . Alkaline accumulators
10/26 . Selection of materials as electrolytes
10/28 . Construction or manufacture
10/281 . [Large cells or batteries with stacks of plate-like electrodes]
10/282 . [with bipolar electrodes]
10/283 . [Cells or batteries with two cup-shaped or cylindrical collectors (H01M 10/281 takes precedence)]
10/285 . [Button cells]
10/286 . [Cells or batteries with wound or folded electrodes]
10/287 . [Small-sized flat cells or batteries for portable equipment (H01M 10/283 and H01M 10/286 take precedence)]
10/288 . [Processes for forming or storing electrodes in the battery container]
10/30 . Nickel accumulators (H01M 10/34 takes precedence)
10/32 . Silver accumulators (H01M 10/34 takes precedence)
10/34 . Gastight accumulators
10/342 . [Gastight lead accumulators (H01M 10/121 takes precedence)]
10/345 . [Gastight metal hydride accumulators]
10/347 . [with solid electrolyte]
10/36 . Accumulators not provided for in groups H01M 10/05-H01M 10/34
10/365 . [Zinc-halogen accumulators]
10/38 . Construction or manufacture
10/39 . working at high temperature
10/3909 . . . [Sodium-sulfur cells]
10/3918 . . . [characterised by the electrolyte]
10/3927 . . . [Several layers of electrolyte or coatings containing electrolyte]
10/3936 . . . [Electrolyte with a shape other than plane or cylindrical]
10/3945 . . . [containing additives or special arrangements in the sodium compartment]
10/3954 . . . [containing additives or special arrangement in the sulfur compartment]
10/3963 . . . [Sealing means between the solid electrolyte and holders]
10/3972 . . . [Flexible parts]
10/3981 . . . [Flat cells]
10/399 . . . [Cells with molten salts]
10/42 . Methods or arrangements for servicing or maintenance of secondary cells or secondary half-cells (H01M 10/60 takes precedence)
10/4207 . . . [for several batteries or cells simultaneously or sequentially]
10/4214 . . . [Arrangements for moving electrodes or electrolyte]
10/4221 . . . [with battery type recognition]
10/4228 . . . [Leak testing of cells or batteries]
10/4235 . . . [Safety or regulating additives or arrangements in electrodes, separators or electrolyte (H01M 10/4242 takes precedence)]
10/4242 . . . [Regeneration of electrolyte or reactants]
10/425 . . . [Structural combination with electronic components, e.g. electronic circuits integrated to the outside of the casing (printed circuits H05K 1/00)]
10/4257 . . . [Smart batteries, e.g. electronic circuits inside the housing of the cells or batteries]
10/4264 . . . [with capacitors]
2010/4271 . . . [Battery management systems including electronic circuits, e.g. control of current or voltage to keep battery in healthy state, cell balancing]
2010/4278 . . . [Systems for data transfer from batteries, e.g. transfer of battery parameters to a controller, data transferred between battery controller and main controller]
10/4285 . . . [Testing apparatus]
2010/4292 . . . [Aspects relating to capacity ratio of electrodes/electrolyte or anode/cathode]
10/44 . Methods for charging or discharging (circuits for charging H02J 7/00)
10/441 . . . [for several batteries or cells simultaneously or sequentially]
10/443 . . . [in response to temperature]
10/445 . . . [in response to gas pressure]
10/446 . . . [Initial charging measures]
10/448 . . . [End of discharge regulating measures]
10/46 . Accumulators structurally combined with charging apparatus (circuits for charging H02J 7/00)
10/465 . . . [with solar battery as charging system]
10/48 . Accumulators combined with arrangements for measuring, testing or indicating condition, e.g. level or density of the electrolyte
Means for temperature control structurally characterised by the shape of the cells response to temperature H01M 10/443 H01M 10/486; charging or discharging in Control systems (measurement of temperature H01M 10/443)
specialised for specific applications
Types of temperature control
H01M 10/617 . . . . for achieving uniformity or desired distribution of temperature
specially adapted for specific applications
Portable devices, e.g. mobile telephones, cameras or pacemakers
Power tools
Vehicles
Stationary installations, e.g. power plant
buffering or backup power supplies
Control systems (measurement of temperature H01M 10/486; charging or discharging in response to temperature H01M 10/443)
characterised by algorithms, flow charts, software details or the like
based on ambient temperature
characterised by the use of reversible temperature-sensitive devices, e.g. NTC, PTC or bimetal devices; characterised by control of the internal current flowing through the cells, e.g. by switching (H01M 10/234 takes precedence)
characterised by the shape of the cells
Cylindrical cells
Prismatic or flat cells, e.g. pouch cells
Means for temperature control structurally associated with the cells
characterised by parameters specified by a numeric value or mathematical formula, e.g. ratios, sizes or concentrations
characterised by gradients (for achieving a desired temperature gradient H01M 10/617)
characterised by electrically insulating or thermally conductive materials
located inside the innermost case of the cells, e.g. mandrels, electrodes or electrolytes
Solid structures for heat exchange or heat conduction
Surfaces specially adapted for heat dissipation or radiation, e.g. fins or coatings
Closed pipes transferring heat by thermal conductivity or phase transition, e.g. heat pipes
Terminals or leads
Rods or plates
arranged between the cells
Solid parts with flow channel passages or pipes for heat exchange (closed pipes H01M 10/6552)
arranged between the cells
characterised by the type of heat-exchange fluid
Gases
with free flow by convection only
with forced flow, e.g. by blowers
using compressed gas
with recirculation or U-turn in the flow path, i.e. back and forth
Means within the gas flow to guide the flow around one or more cells, e.g. manifolds, baffles or other barriers (H01M 10/6565 takes precedence)
Liquids
characterised by flow circuits, e.g. loops, located externally to the cells or cell casings
Fluids undergoing a liquid-gas phase change or transition, e.g. evaporation or condensation (heat pipes H01M 10/6552)
by electric or electromagnetic means
Resistive heaters (arrangements for heating the battery by its resistance to the internal current H01M 10/637)
Peltier elements or thermoelectric devices
by thermal insulation or shielding
by heat storage or buffering, e.g. heat capacity or liquid-solid phase changes or transition
by chemical reactions other than electrochemical reactions of the cells, e.g. catalytic heaters or burners
Heat-exchange relationships between the cells and other systems, e.g. central heating systems or fuel cells
the system being an air-conditioner or an engine
the system being an electronic component, e.g. a CPU, an inverter or a capacitor
Hybrid cells; Manufacture thereof (hybrid capacitors H01G 11/00)
NOTES
1. This group does not cover hybrid cells comprising capacitor electrodes and battery electrodes, which are covered by group H01G 11/00
2. In this group, hybrid cells are electrochemical generators having two different types of half-cells, the half-cell being an electrode-electrolyte combination of either a primary, a secondary or a fuel cell.
WARNING
Group H01M 12/00 is impacted by reclassification into group H01G 11/00 – H01G 11/86.
All groups listed in this Warning should be considered in order to perform a complete search.
Electrochemical current or voltage generators not provided for in groups H01M 6/00 - H01M 12/00; Manufacture thereof

NOTE

This group does not cover solar cells, photocells, photovoltaic cells or photovoltaic cells, which are covered by the following groups:

- semiconductor devices sensitive to light and adapted for the conversion of the energy of such radiation into electrical energy are covered by group H01L 31/00;
- solid-state devices using organic materials as active part specially adapted for sensing light and adapted for the conversion of the energy of such radiation into electrical energy are covered by group H01L 51/42;
- electrolytic light-sensitive devices, e.g. dye-sensitised solar cells, are covered by group H01G 9/20;
- photovoltaic modules structurally associated with energy storage means, e.g. batteries, are covered by group H02S 40/38.

Structural combinations of different types of electrochemical generators

(of fuel cells with other electrochemical devices, e.g. capacitors, electrolyzers)

Safety devices for primary or secondary batteries

Temperature sensitive devices

Bimetal

Fuse

NTC

PTC

Normal resistors

Pressure-sensitive devices

Preventing polarity reversal

Batteries for particular applications

Batteries in stationary systems, e.g. emergency power source in plant

Batteries in motive systems, e.g. vehicle, ship, plane

Batteries in portable systems, e.g. mobile phone, laptop

Fuel cells for particular applications; Specific features of fuel cell system

Fuel cells in stationary systems, e.g. emergency power source in plant

Fuel cells in motive systems, e.g. vehicle, ship, plane

Fuel cells in portable systems, e.g. mobile phone, laptop

Combination of fuel cells with other energy production systems

Combination of fuel cell with other electric generators (combination of fuel cells with other electrochemical generator H01M 16/003)

Cogeneration of heat or hot water

Combination of fuel cells with mechanical energy generators

Electrolytes

Aqueous electrolytes

Acid electrolytes

Phosphoric acid-based

Sulfuric acid-based

Alkaline electrolytes

Non-aqueous electrolytes

Inorganic electrolyte

Room temperature molten salts

Organic electrolyte

Characterised by the solvent

Chlorinated solvents

Fluorinated solvents

Mixture of solvents

Three solvents

Four or more solvents

Room temperature molten salts comprising at least one organic ion

Molten electrolytes used at high temperature

Carbonates

Halogenides

Chlorides

Hydroxides

Nitrates

Solid electrolytes

Inorganic

Oxides

Ion conductive at high temperature

Based on zirconium oxide

Halides

Organic polymers

Immobilising or gelification of electrolyte

Composites

In the form of mixtures

In the form of layered products, e.g. coatings

With adhesive layers