## CPC  COOPERATIVE PATENT CLASSIFICATION

### H  ELECTRICITY

*(NOTE omitted)*

### H01  BASIC ELECTRIC ELEMENTS

*(NOTE omitted)*

### 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.

<table>
<thead>
<tr>
<th>2/00</th>
<th>Constructional details or processes of manufacture of the non-active parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/02</td>
<td>Cases, jackets or wrappings</td>
</tr>
<tr>
<td>2/0202</td>
<td>(for small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment (H01M 2/025 takes precedence))</td>
</tr>
<tr>
<td>2002/0205</td>
<td>(Cases with a shape not covered by groups H01M 2/0207 - H01M 2/0235)</td>
</tr>
<tr>
<td>2/0207</td>
<td>Flat-shaped cells or batteries of flat cells (H01M 2/0222 takes precedence)</td>
</tr>
<tr>
<td>2/021</td>
<td>(with both terminals passing through the case or cover)</td>
</tr>
<tr>
<td>2/0212</td>
<td>(with plate-like or sheet-like terminals (H01M 2/0215 takes precedence))</td>
</tr>
<tr>
<td>2/0215</td>
<td>(with window-like terminals)</td>
</tr>
<tr>
<td>2/0217</td>
<td>Cases of prismatic shape</td>
</tr>
<tr>
<td>2/022</td>
<td>Cases of cylindrical or round shape</td>
</tr>
<tr>
<td>2/0222</td>
<td>Button or coin cell cases</td>
</tr>
<tr>
<td>2/0225</td>
<td>(with cup-shaped terminals)</td>
</tr>
<tr>
<td>2/0227</td>
<td>(with both cup-shaped terminals)</td>
</tr>
<tr>
<td>2/023</td>
<td>(with one cup-shaped terminal)</td>
</tr>
<tr>
<td>2/0232</td>
<td>(with a passing-through terminal (H01M 2/0235 takes precedence))</td>
</tr>
<tr>
<td>2/0235</td>
<td>(with a collector centrally disposed in the active mass, e.g. Leclanch cells)</td>
</tr>
<tr>
<td>2/0237</td>
<td>(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))</td>
</tr>
<tr>
<td>2/024</td>
<td>(Details)</td>
</tr>
<tr>
<td>2/0242</td>
<td>Monobloc manufactured cases comprising multiple compartments</td>
</tr>
<tr>
<td>2/0245</td>
<td>Assembly of different cases, i.e. modular battery or cases particularly provided with means for assembling</td>
</tr>
<tr>
<td>2/0247</td>
<td>(sealed to each other in a non-detachable manner)</td>
</tr>
<tr>
<td>2/025</td>
<td>(for cells or batteries working under specific conditions such as high temperature, gas diffusion, external electrolyte circulation, external supply of reactants)</td>
</tr>
</tbody>
</table>

| 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) |
| 2/0258 | (for large-sized cells or batteries, batteries or cells for traction or motive power or standby power) |
| 2/0259 | (for high-temperature cells) |
| 2/026 | (of wrappings, outside coatings, jackets around completely closed cell elements) |
| 2/0265 | (Casing material forming terminal of the cell) |
| 2/027 | (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) |
| 2002/0297 | (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)) |
2/0417 . . . . [comprising an insulating cover provided with an axial bore for receiving a central current collector]
2/0421 . . . . [with an external conductive cover]
2/0426 . . . . [with a metallic cover of which the borders are soldered or welded with the case]
2/043 . . . . [for large-sized cells or batteries, e.g. LIS batteries, traction or motive power type or standby power batteries (H01M 2/0443 takes precedence)]
2/0434 . . . . [Methods for assembling case and cover]
2/0439 . . . . [without provisions for disassembling]
2/0443 . . . . [for cells or batteries working under specific conditions such as high temperature, gas diffusion, external electrolyte circulation, external supply of reactants]
2/0447 . . . . [High-temperature cells or batteries]
2/0452 . . . . [Hybrid cells or batteries]
2/0456 . . . . [characterised by the shape]
2/046 . . . . [Disk-like lids for cylindrical batteries]
2/0465 . . . . [Button cell lids]
2/0469 . . . . [Lids for flat or sheet-like batteries]
2/0473 . . . . [Lids for prismatic cells]
2/0478 . . . . [characterised by the material]
2/0482 . . . . [Insulating materials]
2/0486 . . . . [Conducting materials]
2/0491 . . . . [characterised by the coating]
2/0495 . . . . [Conductive coating material]
2/06 . . . . Arrangements for introducing electric connectors into or through cases
2/065 . . . . [using glass or ceramic sealing material]
2/08 . . . . Sealing materials
2/10 . . Mountings; Suspension devices; Shock absorbers; Transport or carrying devices; Holders (structural combination of accumulators with charging apparatus H01M 10/46)
2/1005 . . . . [Carrying devices]
2/1011 . . . . [using the terminals or connecting links]
2/1016 . . . . [Cabinets, cases, fixing devices, adapters, racks or battery packs]
2/1022 . . . . [for miniature batteries or batteries for portable equipment (batteries in portable systems H01M 2220/30)]
2/1027 . . . . [with the possibility of incorporating batteries of different sizes]
2/1033 . . . . [providing adapters around the batteries]
2/1038 . . . . [for button cells]
2/1044 . . . . [forming a whole with or incorporated in or fixed to the electronic apparatus]
2/105 . . . . [for cells of cylindrical configuration]
2/1055 . . . . [forming a whole with or incorporated in or fixed to the electronic apparatus]
2/1061 . . . . [for cells of prismatic configuration or for sheet-like batteries]
2/1066 . . . . [forming a whole with or incorporated in or fixed to the electronic apparatus]
2/1072 . . . . [for starting, lighting or ignition batteries; Vehicle traction batteries; Stationary or load leading batteries (batteries in stationary systems H01M 2220/10, batteries in motive systems H01M 2220/20)]
2/1077 . . . . [Racks, groups of several batteries (H01M 2/1088 takes precedence)]
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

Processes of manufacture in general

Methods of deposition of the material

by coating on electrode collectors

by coating on an electrolyte layer

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

by extrusion

by screen printing

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

involving spraying

involving vapour deposition

physical vapour deposition

{sputtering

{Chemical vapour deposition

{involving compressing or compaction

{Molding

Rolling or calendering

{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
Electrodes for accumulators with non-aqueous electrolyte, e.g. for lithium-accumulators; Processes of manufacture

Electrodes based on inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoFy other than oxides or hydroxides, e.g. sulfides, e.g. molten sodium electrodes, which subject matter is classified in group H01M 10/39

Electrodes based on metals, Si or alloys of inorganic oxides or hydroxides containing halogen atoms, e.g. LiMnOxFy

Electrodes based on mixed oxides or hydroxides, or on mixtures of oxides or hydroxides, e.g. LiCoOx

Applications of electrodes based on metals, Si or alloys of inorganic oxides or hydroxides containing halogen atoms, e.g. LiMnOxFy

Electrodes based on metals, Si or alloys of inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoFy other than oxides or hydroxides, e.g. sulfides, e.g. molten sodium electrodes, which subject matter is classified in group H01M 10/39

Electrodes based on inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoFy other than oxides or hydroxides, e.g. sulfides, e.g. molten sodium electrodes, which subject matter is classified in group H01M 10/39

Electrodes based on electro-active polymers

Electrodes for lead-acid accumulators

Processes of manufacture of Planté electrodes of pasted electrodes

Drying of pasted electrodes

Forming of electrodes

Drying or preserving electrodes after forming

Electrodes for alkaline accumulators

Hydrogen storage electrodes

Zinc electrodes

Cadmium electrodes

Iron electrodes

Processes of manufacture

Precipitating active material on the carrier by electrochemical methods

Pressing

Nickel oxide or hydroxide electrodes

Silver oxide or hydroxide electrodes

Selection of substances as active materials, active masses, active liquids (electrode materials of hybrid or double layer capacitors H01G 11/30; H01G 11/50)

Composites

as mixtures

layered products

Liquid depolarisers

of elements or alloys

Alkaline or alkaline earth metals elements (H01M 4/40 takes precedence)

Lithium (H01M 4/405 takes precedence)

Hydrogen absorbing alloys

of the type LaNi5

Silicon or alloys based on silicon

 Tin or alloys based on tin

Halogens

Alloys based on alkali metals

Alloys based on lithium

Alloys based on zinc

Alloys based on cadmium

Alloys based on magnesium or aluminium

Aluminium based

Magnesium based

of inorganic oxides or hydroxides

of mercury

for non-aqueous cells (H01M 4/485 takes precedence)

of mixed oxides or hydroxides for inserting or intercalating light metals, e.g. LiTi12O4 or LiTi2OxFy (H01M 4/505; H01M 4/525 take precedence)

of manganese

for non-aqueous cells (H01M 4/505 takes precedence)

of mixed oxides or hydroxides containing manganese for inserting or intercalating light metals, e.g. LiMn2O4 or LiMn2OxFy

of nickel, cobalt or iron

of iron for aqueous cells

for non-aqueous cells (H01M 4/525 takes precedence)
NOTE

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

4/583 . . . . Carbonaceous material, e.g. graphite-intercalation compounds or CFx
4/5835 . . . . (Comprising fluorine or fluoride salts) for inserting or intercalating light metals
4/60 . . . . of organic compounds
4/602 . . . . (Polymers)
4/604 . . . . (containing aliphatic main chain polymers)
4/606 . . . . (containing aromatic main chain polymers)
4/608 . . . . (containing heterocyclic rings)
4/62 . . . . Selection of inactive substances as ingredients for active masses, e.g. binders, fillers
4/621 . . . . (Binders)
4/622 . . . . (being polymers)
4/623 . . . . (fluorinated polymers)
4/624 . . . . (Electric conductive fillers)
4/625 . . . . (Carbon or graphite)
4/626 . . . . (Metals)
4/627 . . . . (Expanders for lead-acid accumulators)
4/628 . . . . (Inhibitors, e.g. gassing inhibitors, corrosion inhibitors)
4/64 . . . . Carriers or collectors (current collector for hybrid or electric double layer capacitors H01G 11/66)
4/66 . . . . Selection of materials
4/661 . . . . (Metal or alloys, e.g. alloy coatings (H01M 4/669 take precedence))
4/662 . . . . (Alloys (collectors of lead alloys H01M 4/685))
4/663 . . . . (containing carbon or carbonaceous materials as conductive part, e.g. graphite, carbon fibres)
4/664 . . . . (Ceramic materials)
4/665 . . . . (Composites)
4/666 . . . . (in the form of mixed materials (H01M 4/668 takes precedence))
Selection of catalytic material

Precedence:

- Metals or alloys (H01M 4/92 takes precedence)

- [Supports for the deposition of the catalytic active composition (H01M 4/90 takes precedence)]

- Gas diffusion layers

- Electrolytic membranes

- Temporary supports, e.g. decal

- Treatment of supports before application of the catalytic active composition (coated porous composites H01M 8/0245)

- Wet proofing

- Methods for deposition of the catalytic active composition

- Coating with slurry or ink

- Ink jet printing

- Screen printing

- Methods for shaping the electrode into free-standing bodies, like sheets, films or grids, e.g. moulding, hot-pressing, casting without supports, extrusion without support

- Treatment steps after deposition of the catalytic active composition or after shaping of the electrode being free-standing body

- Coating using a catalyst salt precursor in solution followed by evaporation and reduction of the precursor

- Impregnation

- followed by reduction of the catalyst salt precursor

- Electrodeposition

- Casting, e.g. tape casting, vacuum slip casting

- Powder spraying, e.g. wet or dry powder spraying, plasma spraying

- Extrusion

- Vapour deposition

- (Sputtering)

- Methods for shaping the electrode into free-standing bodies, like sheets, films or grids, e.g. moulding, hot-pressing, casting without support, extrusion without support

- Treatment steps after deposition of the catalytic active composition or after shaping of the electrode being free-standing body

- Heat treatment, e.g. drying, baking

- Sintering or firing

- Cosintering or cofiring of a catalytic active layer with another type of layer

- Impregnation or coating of the catalyst layer, e.g. by an ionomer

- Pressing, rolling, calendaring (membrane electrode assemblies H01M 8/1004)

- Selection of catalytic material

- [Organic or organo-metallic compounds]

- Oxides, hydroxides or oxygenated metallic salts

- Oxides specially used in fuel cell operating at high temperature, e.g. SOFC

- Complex oxides, optionally doped, of the type M1MeO3, M1 being an alkaline earth metal or a rare earth, Me being a metal, e.g. perovskites

- Metals or alloys (H01M 4/92 takes precedence)

- [specially used in fuel cell operating at high temperature, e.g. SOFC]

- (of noble metals or noble-metal based alloys)

- (of metal-ceramic composites or mixtures, e.g. cermets)

- [Catalytic material supported on carriers, e.g. powder carriers (H01M 4/8807, H01M 4/881, H01M 4/8814, H01M 4/9025 take precedence)]

- [on carbon or graphite]

- Unsupported catalytic particles; loose particulate catalytic materials, e.g. in fluidised state

- Metals of platinum group (H01M 4/94, H01M 4/9058 take precedence)

- Alloys or mixtures with metallic elements

- Compounds thereof with non-metallic elements

- supported on carriers, e.g. powder carriers

- on carbon or graphite

- Unsupported catalytic particles; loose particulate catalytic materials, e.g. in fluidised state

- Non-porous diffusion electrodes, e.g. palladium membranes, ion exchange membranes

- Carbon-based electrodes

- Raney-type electrodes

NOTE

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

- Devices for making primary cells

- Details of non-active parts H01M 2/00; of electrodes H01M 4/00

- Cells with aqueous electrolyte

- [characterised by aqueous electrolyte]

- Dry cells, i.e. cells wherein the electrolyte is rendered non-fluid

- with cup shaped electrodes

- (of the reversed type, i.e. anode in the centre)

- with wound or folded electrodes

- (Cells with electrode of only one polarity being folded or wound)

- [Elliptic wound cells]

- with flat electrodes

- Cells with non-aqueous electrolyte ([H01M 10/05 takes precedence])

- containing ammonia

- with organic electrolyte (H01M 6/18, H01M 10/05 take precedence)

- [characterised by the electrolyte]

- [by the solvent (organic electrolyte solvents H01M 2300/0028)]

- [by the solute]

- [by additives]

- with solid electrolyte

- [with polymeric electrolytes (organic polymers electrolytes H01M 2300/0082)]

- [with halogenide as solid electrolyte (halide solid electrolytes H01M 2300/0086)]

- [with fluoride as solid electrolyte]

- [with oxides, hydroxides or oxysalts as solid electrolytes (oxides solid electrolyte H01M 2300/0071)]

- [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 reclassification 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 reclassification 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 reclassification 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 reclassification 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 reclassification 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 . . . . [Reactor storage and supply, e.g. means for feeding, pipes]
H01M

8/04208 . . . . [Cartridges, cryogenic media or cryogenic reservoirs]
8/04216 . . . . [characterised by the choice for a specific material, e.g. carbon, hydride, absorbent]
8/04223 . . . during start-up or shut-down; Depolarisation or activation, e.g. purging; Means for short-circuiting defective fuel cells

**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 range H01M 8/04225 - H01M 8/04228 and H01M 8/043 - H01M 8/04303 in order to perform a complete search.

8/04225 . . . during start-up

**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.

8/04228 . . . during shut-down
8/04231 . . . . [Purging of the reactants]
8/04238 . . . . [Depolarisation]
8/04246 . . . . [Short circuiting means for defective fuel cells (detection of defective fuel cells H01M 8/04664, methods for shunting fuel cells H01M 8/04955)]
8/04253 . . . . [Means for solving freezing problems]
8/04268 . . . . [Heating of fuel cells during the start-up of the fuel cells]
8/04276 . . . . Arrangements for managing the electrolyte stream, e.g. heat exchange
8/04283 . . . . [Supply means of electrolyte to or in matrix-fuel cells]
8/04291 . . . . Arrangements for managing water in solid electrolyte fuel cell systems (H01M 8/04119 takes precedence)
8/04298 . . . . Processes for controlling fuel cells or fuel cell systems
8/043 . . . . 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.

8/04302 . . . . applied during start-up
8/04303 . . . . applied during shut-down
8/04305 . . . . [Modeling, demonstration models of fuel cells, e.g. for training purposes]

8/04313 . . . . characterised by the detection or assessment of variables; characterised by the detection or assessment of failure or abnormal function
8/0432 . . . . . . Temperature; Ambient temperature
8/04328 . . . . . . [of anode reactants at the inlet or inside the fuel cell]
8/04335 . . . . . . [of cathode reactants at the inlet or inside the fuel cell]
8/04343 . . . . . . [of anode exhausts]
8/0435 . . . . . . [of cathode exhausts]
8/04358 . . . . . . [of the coolant]
8/04365 . . . . . . [of other components of a fuel cell or fuel cell stacks]
8/04373 . . . . . . [of auxiliary devices, e.g. reformers, compressors, burners]
8/0438 . . . . . . Pressure; Ambient pressure; Flow
8/04388 . . . . . . [of anode reactants at the inlet or inside the fuel cell]
8/04395 . . . . . . [of cathode reactants at the inlet or inside the fuel cell]
8/04402 . . . . . . [of anode exhausts]
8/0441 . . . . . . [of cathode exhausts]
8/04417 . . . . . . [of the coolant]
8/04425 . . . . . . [at auxiliary devices, e.g. reformers, compressors, burners]
8/04432 . . . . . . [Pressure differences, e.g. between anode and cathode]
8/0444 . . . . Concentration; Density (H01M 8/0492 takes precedence)
8/04447 . . . . . . [of anode reactants at the inlet or inside the fuel cell]
8/04455 . . . . . . [of cathode reactants at the inlet or inside the fuel cell]
8/04462 . . . . . . [of anode exhausts]
8/0447 . . . . . . [of cathode exhausts]
8/04477 . . . . . . [of the electrolyte]
8/04485 . . . . . . [of the coolant]
8/04492 . . . . . . Humidity; Ambient humidity; Water content
8/045 . . . . . . [of anode reactants at the inlet or inside the fuel cell]
8/04507 . . . . . . [of cathode reactants at the inlet or inside the fuel cell]
8/04514 . . . . . . [of anode exhausts]
8/04522 . . . . . . [of cathode exhausts]
8/04529 . . . . . . [of the electrolyte]
8/04537 . . . . . . Electric variables
8/04544 . . . . . . [Voltage]
8/04552 . . . . . . [of the individual fuel cell]
8/04559 . . . . . . [of fuel cell stacks]
8/04567 . . . . . . [of auxiliary devices, e.g. batteries, capacitors]
8/04574 . . . . . . [Current]
8/04582 . . . . . . [of the individual fuel cell]
8/04589 . . . . . . [of fuel cell stacks]
8/04597 . . . . . . [of auxiliary devices, e.g. batteries, capacitors]
8/04604 . . . . . . [Power, energy, capacity or load]
8/04611 . . . . . . [of the individual fuel cell]
8/04619 . . . . . . [of fuel cell stacks]
8/04626 . . . . . . [of auxiliary devices, e.g. batteries, capacitors]
8/04634 . . . . . . [Other electric variables, e.g. resistance or impedance]
Fuel cells with solid electrolytes (regenerative fuel cells H01M 8/18)

Combination of fuel cells with means for production of reactants or for treatment of residues (regenerative fuel cells H01M 8/18)

Direct internal reforming at the anode of the fuel cell

Treatment of gaseous reactants or gaseous residues, e.g. cleaning

Removal of carbon monoxide or carbon dioxide

Removal of sulfur

Treatment of fuel cell exhausts or of other components of fuel cell stacks

Pressure differences, e.g. between anode and cathode

Humidity: Water content

Concentration; Density (H01M 8/04828 takes precedence)

Pressure; Flow

(fuel cell reactants)

(fuel cell exhausts)

(coolant)

(auxiliary devices, e.g. reformer, compressor, burner)

(fuel cell reactants)

(fuel cell exhausts)

(coolant)

(electrolyte)

(fuel cell reactants)

(fuel cell exhausts)

(electrolyte)

(electric variables)

(Voltage)

(individual fuel cell)

(fuel cell stacks)

(auxiliary devices, e.g. batteries, capacitors)

(Current)

(individual fuel cell)

(fuel cell stacks)

(auxiliary devices, e.g. batteries, capacitors)

(Power, energy, capacity or load)

(individual fuel cell)

(fuel cell stacks)

(auxiliary devices, e.g. batteries, capacitors)

(other electric variables, e.g. resistance or impedance)

(individual fuel cell)

(fuel cell stacks)

(auxiliary devices, e.g. batteries, capacitors)

Shut-off or shut-down of fuel cells

characterised by the implementation of mathematical or computational algorithms, e.g. feedback control loops, fuzzy logic, neural networks or artificial intelligence

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. polyyarylenes, polystyrenes or polybutadiene-styrenes
8/1025 ··········· having only carbon and oxygen, e.g. polyethers, sulfonated polyetheretherketones [S-PEEK], sulfonated polysaccharides, sulfonated celluloses or sulfonated polyesters
8/1027 ··········· having carbon, oxygen and other atoms, e.g. sulfonated polyethersulfones [S-PES]
8/103 ··········· having nitrogen, e.g. sulfonated polybenzimidazoles [S-PBI], polybenzimidazoles with phosphoric acid, sulfonated polyamides [S-PA] or sulfonated polyphosphazenes [S-PPh]
8/1032 ··········· having sulfur, e.g. sulfonated-polyethersulfones [S-PES]
8/1034 ··········· having phosphorus, e.g. sulfonated polyphosphazenes [S-PPh]
8/1037 ··········· having silicon, e.g. sulfonated crosslinked polydimethylsiloxanes
8/1039 ··········· halogenated, e.g. sulfonated polyvinylidene fluorides
8/1041 ··········· Polymer electrolyte composites, mixtures or blends
8/1044 ··········· Mixtures of polymers, of which at least one is ionically conductive
8/1046 ··········· Mixtures of at least one polymer and at least one additive
8/1048 ··········· Ion-conducting additives, e.g. ion-conducting particles, heteropolyacids, metal phosphate or polybenzimidazole with phosphoric acid
8/1051 ··········· Non-ion-conducting additives, e.g. stabilisers, SiO$_2$ or ZrO$_2$
8/1053 ··········· consisting of layers of polymers with at least one layer being ionically conductive
8/1055 ··········· [Inorganic layers on the polymer electrolytes, e.g. inorganic coatings]
8/1058 ··········· characterised by a porous support having no ion-conducting properties
8/106 ··········· characterised by the chemical composition of the porous support
8/1062 ··········· characterised by the physical properties of the porous support, e.g. its porosity or thickness
8/1065 ··········· characterised by the form, e.g. perforated or wave-shaped
8/1067 ··········· characterised by their physical properties, e.g. porosity, ionic conductivity or thickness
8/1069 ··········· characterised by the manufacturing processes
8/1072 ··········· by chemical reactions, e.g. in situ polymerisation or in situ crosslinking
8/1074 ··········· [Sol-gel processes]
8/1076 ··········· [Micromachining techniques, e.g. masking, etching steps or photolithography]
8/1079 ··········· [Inducing porosity into non porous precursors membranes, e.g. leaching, pore stretching]
8/1081 ··········· starting from solutions, dispersions or slurries exclusively of polymers
8/1083 ··········· [Starting from polymer melts other than monomer melts]
8/1086 ··········· After-treatment of the membrane other than by polymerisation
8/1088 ··········· Chemical modification, e.g. sulfonation

8/109 ··········· [thermal other than drying, e.g. sintering]
8/1093 ··········· [mechanical, e.g. pressing, puncturing]

2008/1095 ··········· Fuel cells with polymeric electrolytes

8/1097 ··········· Fuel cells applied on a support, e.g. miniature fuel cells deposited on silica supports
8/12 ··········· operating at high temperature, e.g. with stabilised ZrO$_2$ electrolyte
8/1213 ··········· characterised by the electrode/electrolyte combination or the supporting material
8/122 ··········· Corrugated, curved or wave-shaped MEA
8/1226 ··········· characterised by the supporting layer
8/1231 ··········· with both reactants being gaseous or vapourised
8/1233 ··········· with one of the reactants being liquid, solid or liquid-charged
8/124 ··········· characterised by the process of manufacturing or by the material of the electrolyte
8/1246 ··········· the electrolyte consisting of oxides
8/1253 ··········· the electrolyte containing zirconium oxide
8/126 ··········· the electrolyte containing cerium oxide
8/1266 ··········· [the electrolyte containing bismuth oxide]
8/1273 ··········· [Fuel cells with solid halide electrolytes (solid halide electrolyte H01M 2300/008)]

2008/128 ··········· [Fuel cells with solid halide electrolytes (solid halide electrolyte H01M 2300/008)]
8/1286 ··········· Fuel cells applied on a support, e.g. miniature fuel cells deposited on silica supports
8/1293 ··········· [Fuel cells with solid oxide electrolytes]
8/14 ··········· Fuel cells with fused electrolytes
8/141 ··········· [the anode and the cathode being gas-permeable electrodes or electrode layers]
8/142 ··········· [with matrix-supported or semi-solid matrix-reinforced electrolyte]
8/143 ··········· [with liquid, solid or electrolyte-charged reactants]
8/144 ··········· [characterised by the electrolyte material]
8/145 ··········· [comprising carbonates]
8/146 ··········· [Fuel cells with molten hydroxide (molten hydroxide electrolyte H01M 2300/006)]

2008/147 ··········· [Fuel cells with molten carbonates]
8/148 ··········· [Measures, other than selecting a specific electrode material, to reduce electrode dissolution]
8/16 ··········· Biochemical fuel cells, i.e. cells in which microorganisms function as catalysts
8/18 ··········· Regenerative fuel cells, e.g. redox flow batteries or secondary fuel cells
8/182 ··········· [Regeneration by thermal means]
8/184 ··········· [Regeneration by electrochemical means]
8/186 ··········· [by electrolytic decomposition of the electrolytic solution or the formed water product]
8/188 ··········· [by recharging of redox couples containing fluids; Redox flow type batteries]
8/20 ··········· Indirect fuel cells, e.g. fuel cells with redox couple being irreversible (H01M 8/18 takes precedence)
8/22 ··········· 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
Fuel cells in which the fuel is based on compounds containing nitrogen, e.g. hydrazine, ammonia

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

Dialytic cells or batteries; Reverse electrodialysis cells or batteries

Grouping of fuel cells, e.g. stacking of fuel cells

Processes or apparatus for grouping fuel cells

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.

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

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

High-temperature cells with solid electrolytes

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

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

High-temperature cells with solid electrolytes

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

Grouping by arranging unit cells in a plane (H01M 8/2425, H01M 8/244 take precedence)
8/243 . . . 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.

8/2432 . . . 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.

8/2435 . . . with 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.

8/244 . . . with matrix-supported molten electrolyte

**WARNING**

Group H01M 8/244 is/are 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.

8/2445 (Frozen) . . . [comprising 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 8/2457 and H01M 8/2459.
Groups H01M 8/2445 should be considered when searching group H01M 8/2457 or H01M 8/2459 in order to perform a complete search.

8/245 . . . [comprising framed electrodes or intermediary frame-like gaskets]

**WARNING**

Group H01M 8/245 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 8/2428, H01M 8/2432, H01M 8/242 and H01M 8/2425.
Groups H01M 8/245 should be considered when searching any of the listed groups of this warning in order to perform a complete search.

8/2455 . . . with liquid, solid or electrolyte-charged reactants
8/2457 . . . 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.

8/2459 (Frozen) . . . {Comprising electrode layers with interposed electrolyte compartment with possible electrolyte supply or circulation]

**WARNING**

Group H01M 8/2459 is/are incomplete pending reclassification of documents from groups H01M 8/2405 and H01M 8/2445.
Groups H01M 8/2405, H01M 8/2445 and H01M 8/2459 should be considered in order to perform a complete search.

8/246 . . . [having liquid, solid or electrolyte-charged reactants with framed electrodes or intermediary frame-like gaskets]

**WARNING**

Group H01M 8/246 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 8/2428, H01M 8/2432, H01M 8/242 and H01M 8/2425.
Groups H01M 8/246 should be considered when searching any of the listed groups of this warning in order to perform a complete search.

8/2465 . . . Details of groupings of fuel cells

**WARNING**

Group H01M 8/2465 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.

8/247 . . . Arrangements for tightening a stack, for accommodation of a stack in a tank or for assembling different tanks
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.

10/0404 . . . {Machines for assembling batteries}
10/0409 . . . {for cells with wound electrodes}
10/0413 . . . {Large-sized flat cells or batteries for motive or stationary systems with plate-like electrodes}
10/0418 . . . {with bipolar electrodes}
10/0422 . . . {Cells or battery with cylindrical casing}
10/0427 . . . {Button cells}
10/0431 . . . {Cells with wound or folded electrodes (H01M 10/045 takes precedence)}
10/0436 . . . {Small-sized flat cells or batteries for portable equipment}
10/044 . . . {with bipolar electrodes}
10/0445 . . . {Multimode batteries, e.g. containing auxiliary cells or electrodes switchable in parallel or series connections}
10/045 . . . {Cells or batteries with folded plate-like electrodes}
10/0454 . . . {Cells or batteries with electrodes of only one polarity folded}
10/0459 . . . {Cells or batteries with folded separator between plate-like electrodes}
10/0463 . . . {Cells or batteries with horizontal or inclined electrodes}
10/0468 . . . {Compression means for stacks of electrodes and separators}
10/0472 . . . {Vertically superposed cells with vertically disposed plates}
10/0477 . . . {with circular plates}
10/0481 . . . {Compression means other than compression means for stacks of electrodes and separators}
10/0486 . . . {Frames for plates or membranes}
10/049 . . . {Processes for forming or storing electrodes in the battery container}
10/05 . . . Accumulators with non-aqueous electrolyte (H01M 10/39 takes precedence)
10/052 . . . Li-accumulators
10/0525 . . . Rocking-chair batteries, i.e. batteries with internal insertion or intercalation in both electrodes; Lithium-ion batteries
10/054 . . . Accumulators with insertion or intercalation of metals other than lithium, e.g. with magnesium or aluminium
10/056 . . . characterised by the materials used as electrolytes, e.g. mixed inorganic/organic electrolytes (electrolytes for hybrid or electric double layer capacitors H01G 11/54)
10/0561 . . . the electrolyte being constituted of inorganic materials only
10/0562 . . . Solid materials
10/0563 . . . Liquid materials, e.g. for Li-SOCl$_2$ cells
10/0564 . . . the electrolyte being constituted of organic materials only
10/0565 . . . Polymeric materials, e.g. gel-type or solid-type
10/0566 . . . Liquid materials
10/0567 . . . characterised by the additives
10/0568 . . . characterised by the solutes
10/0569 . . . characterised by the solvents
10/058 . . . Construction or manufacture

WARNING
Group H01M 10/058 is incomplete pending reclassification of documents from group H01M 10/04.
Groups H01M 10/04 and H01M 10/058 should be considered in order to perform a complete search.
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 sulfur 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
H01M

10/482 . . . . [for several batteries or cells simultaneously or sequentially]
10/484 . . . . [for measuring electrolyte level, electrolyte density or electrolyte conductivity]
10/486 . . . . [for measuring temperature]
10/488 . . . . [Cells or batteries combined with indicating means for external visualisation of the condition, e.g. by change of colour or of light intensity]
10/52 . . . . Removing gases inside the secondary cell, e.g. by absorption (vent plugs or other mechanical arrangements for facilitating escape of gases H01M 2/12)
10/523 . . . . [by recombination on a catalytic material]
10/526 . . . . [by gas recombination on the electrode surface or by structuring the electrode surface to improve gas recombination]
10/54 . . . . Reclaiming serviceable parts of waste accumulators
10/60 . . . . Heating or cooling; Temperature control
10/61 . . . . Types of temperature control
10/613 . . . . Cooling or keeping cold
10/615 . . . . Heating or keeping warm
10/617 . . . . for achieving uniformity or desired distribution of temperature
10/62 . . . . specially adapted for specific applications
10/623 . . . . Portable devices, e.g. mobile telephones, cameras or pacemakers
10/6235 . . . . Power tools
10/625 . . . . Vehicles
10/627 . . . . Stationary installations, e.g. power plant, buffering or backup power supplies
10/63 . . . . Control systems (measurement of temperature H01M 10/486; charging or discharging in response to temperature H01M 10/443)
10/633 . . . . characterised by algorithms, flow charts, software details or the like
10/635 . . . . based on ambient temperature
10/637 . . . . 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 10/24 takes precedence)
10/64 . . . . characterised by the shape of the cells
10/643 . . . . Cylindrical cells
10/647 . . . . Prismatic or flat cells, e.g. pouch cells
10/65 . . . . Means for temperature control structurally associated with the cells
10/651 . . . . characterised by parameters specified by a numeric value or mathematical formula, e.g. ratios, sizes or concentrations
10/652 . . . . characterised by gradients (for achieving a desired temperature gradient H01M 10/617)
10/653 . . . . characterised by electrically insulating or thermally conductive materials
10/654 . . . . located inside the innermost case of the cells, e.g. mandrels, electrodes or electrolytes
10/655 . . . . Solid structures for heat exchange or heat conduction
10/6551 . . . . Surfaces specially adapted for heat dissipation or radiation, e.g. fins or coatings
10/6552 . . . . Closed pipes transferring heat by thermal conductivity or phase transition, e.g. heat pipes
10/6553 . . . . Terminals or leads
10/6554 . . . . Rods or plates
10/6555 . . . . arranged between the cells
10/6556 . . . . Solid parts with flow channel passages or pipes for heat exchange (closed pipes H01M 10/6552)
10/6557 . . . . arranged between the cells
10/656 . . . . characterised by the type of heat-exchange fluid
10/6561 . . . . Gases
10/6562 . . . . with free flow by convection only
10/6563 . . . . with forced flow, e.g. by blowers
10/6564 . . . . using compressed gas
10/6565 . . . . with recirculation or U-turn in the flow path, i.e. back and forth
10/6566 . . . . 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)
10/6567 . . . . Liquids
10/6568 . . . . characterised by flow circuits, e.g. loops, located externally to the cells or cell casings
10/6569 . . . . Fluids undergoing a liquid-gas phase change or transition, e.g. evaporation or condensation (heat pipes H01M 10/6552)
10/657 . . . . by electric or electromagnetic means
10/6571 . . . . Resistive heaters (arrangements for heating the battery by its resistance to the internal current H01M 10/637)
10/6572 . . . . Peltier elements or thermoelectric devices
10/658 . . . . by thermal insulation or shielding
10/659 . . . . by heat storage or buffering, e.g. heat capacity or liquid-solid phase changes or transition
10/6595 . . . . by chemical reactions other than electrochemical reactions of the cells, e.g. catalytic heaters or burners
10/66 . . . . Heat-exchange relationships between the cells and other systems, e.g. central heating systems or fuel cells
10/663 . . . . the system being an air-conditioner or an engine
10/667 . . . . the system being an electronic component, e.g. a CPU, an inverter or a capacitor

12/00 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.


**WARNING**

Group **H01M 12/005** is no longer used for the classification of documents as of January 1, 2019. The content of this group is being reclassified into **H01G 11/00 - H01G 11/86**. All groups listed in this Warning should be considered in order to perform a complete search.

**12/02** Details (of non-active parts **H01M 2/00**: of electrodes **H01M 4/00**)

**12/04** composed of a half-cell of the fuel-cell type and of a half-cell of the primary-cell type

**12/06** . . with one metallic and one gaseous electrode

**12/065** . . [with plate-like electrodes or stacks of plate-like electrodes]

**12/08** composed of a half-cell of a fuel-cell type and a half-cell of the secondary-cell type

**12/085** . . [Zinc-halogen cells or batteries]

**14/00** 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, photoelectrochemical 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 40/18**.

**14/005** [Photoelectrochemical storage cells (light sensitive devices **H01G 9/20**: semiconductors sensitive to light **H01L 31/00**)]

**16/00** Structural combinations of different types of electrochemical generators

**16/003** [of fuel cells with other electrochemical devices, e.g. capacitors, electrolyzers]

**16/006** . . [of fuel cells with rechargeable batteries]

**2200/00** Safety devices for primary or secondary batteries

**2200/10** Temperature sensitive devices

**2200/101** Bimetal

**2200/103** Fuse

**2200/105** NTC

**2200/106** PTC

**2200/108** Normal resistors