

# CPC COOPERATIVE PATENT CLASSIFICATION

## H ELECTRICITY

(NOTE omitted)

## H01 BASIC ELECTRIC ELEMENTS

(NOTES 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.

<b>4/00</b>	<b>Electrodes</b>	4/0447	. . . . . {of complete cells or cells stacks}
4/02	. Electrodes composed of or comprising active material	4/045	. . . . {Electrochemical coating; Electrochemical impregnation}
2004/021	. . {Physical characteristics, e.g. porosity, surface area}	4/0452	. . . . . {from solutions}
2004/022	. . {Electrodes made of one single microscopic fiber}	4/0454	. . . . . {from melts}
2004/023	. . {Gel electrode}	4/0457	. . . . . {from dispersions or suspensions; Electrophoresis}
2004/024	. . {Insertable electrodes}	4/0459	. . . . {Electrochemical doping, intercalation, occlusion or alloying}
2004/025	. . {with shapes other than plane or cylindrical}	4/0461	. . . . . {Electrochemical alloying}
2004/026	. . {characterised by the polarity}	4/0464	. . . . {Electro organic synthesis}
2004/027	. . . {Negative electrodes}	4/0466	. . . . . {Electrochemical polymerisation}
2004/028	. . . {Positive electrodes}	4/0469	. . . . {Electroforming a self-supporting electrode; Electroforming of powdered electrode material}
2004/029	. . . {Bipolar electrodes}	4/0471	. . . {involving thermal treatment, e.g. firing, sintering, backing particulate active material, thermal decomposition, pyrolysis}
4/04	. . Processes of manufacture in general	4/0473	. . . {Filling tube-or pockets type electrodes; Applying active mass in cup-shaped terminals}
4/0402	. . . {Methods of deposition of the material}	4/0476	. . . . {with molten material}
4/0404	. . . . {by coating on electrode collectors}	4/0478	. . . . {with dispersions, suspensions or pastes}
4/0407	. . . . {by coating on an electrolyte layer}	4/048	. . . . {with dry powder}
4/0409	. . . . {by a doctor blade method, slip-casting or roller coating}	4/0483	. . . {by methods including the handling of a melt (H01M 4/0438, take precedence)}
4/0411	. . . . {by extrusion}	4/0485	. . . . {Casting}
4/0414	. . . . {by screen printing}	4/0488	. . . . {Alloying}
4/0416	. . . . {involving impregnation with a solution, dispersion, paste or dry powder (H01M 4/0438 takes precedence)}	4/049	. . . {Manufacturing of an active layer by chemical means}
4/0419	. . . . {involving spraying}	4/0492	. . . . {Chemical attack of the support material}
4/0421	. . . . {involving vapour deposition}	4/0495	. . . . {Chemical alloying}
4/0423	. . . . . {Physical vapour deposition}	4/0497	. . . . {Chemical precipitation}
4/0426	. . . . . {Sputtering}	4/06	. . Electrodes for primary cells
4/0428	. . . . . {Chemical vapour deposition}	4/08	. . . Processes of manufacture
4/043	. . . {involving compressing or compaction}	4/10	. . . . of pressed electrodes with central core, i.e. dollies
4/0433	. . . . {Molding}	4/12	. . . . of consumable metal or alloy electrodes (use of alloy compositions as active materials H01M 4/38)
4/0435	. . . . {Rolling or calendering}		
4/0438	. . . {by electrochemical processing (electroless electrochemical plating C23C 18/54)}		
4/044	. . . . {Activating, forming or electrochemical attack of the supporting material}		
4/0442	. . . . . {Anodisation, Oxidation (electrolytic coating by anodisation C25D 9/00)}		
4/0445	. . . . . {Forming after manufacture of the electrode, e.g. first charge, cycling}		

- 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 carbonaceous 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 . . . . of electrodes based on carbonaceous material, e.g. graphite-intercalation compounds or CFx
- 4/1395 . . . . of electrodes based on metals, Si or alloys
- 4/1397 . . . . of 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 LaNi<sub>5</sub>}
- 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. LiTi<sub>2</sub>O<sub>4</sub> or LiTi<sub>2</sub>OxFy ([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. LiMn<sub>2</sub>O<sub>4</sub> or LiMn<sub>2</sub>OxFy
- 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)}
- 4/525 . . . . . of mixed oxides or hydroxides containing iron, cobalt or nickel for inserting or intercalating light metals, e.g. LiNiO<sub>2</sub>, LiCoO<sub>2</sub> or LiCoOxFy
- 4/54 . . . . of silver
- 4/56 . . . . of lead
- 4/57 . . . . . of "grey lead", i.e. powders containing lead and lead oxide
- 4/58 . . . of inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoFy; of polyanionic structures, e.g. phosphates, silicates or borates
- 4/5805 . . . . {Phosphides}
- 4/581 . . . . {Chalcogenides or intercalation compounds thereof}
- 4/5815 . . . . . {Sulfides}
- 4/582 . . . . {Halogenides}
- 4/5825 . . . . {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
- 4/583 . . . . Carbonaceous material, e.g. graphite-intercalation compounds or CFx
- 4/5835 . . . . . {Comprising fluorine or fluoride salts}
- 4/587 . . . . . 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)}
- 4/667 . . . . . {in the form of layers, e.g. coatings}
- 4/668 . . . . . {Composites of electroconductive material and synthetic resins}
- 4/669 . . . . . {Steels}
- 4/68 . . . . for use in lead-acid accumulators
- 4/685 . . . . . {Lead alloys}
- 4/70 . . . characterised by shape or form
- 4/72 . . . . Grids
- 4/73 . . . . . for lead-acid accumulators, e.g. frame plates
- 4/74 . . . . . Meshes or woven material; Expanded metal
- 4/742 . . . . . . {perforated material}
- 4/745 . . . . . . {Expanded metal}
- 4/747 . . . . . . {Woven material}
- 4/75 . . . . Wires, rods or strips
- 4/76 . . . . Containers for holding the active material, e.g. tubes, capsules
- 4/762 . . . . . {Porous or perforated metallic containers}
- 4/765 . . . . . {Tubular type or pencil type electrodes; tubular or multitubular sheaths or covers of insulating material for said tubular-type electrodes}
- 4/767 . . . . . . {Multitubular sheaths or covers}
- 4/78 . . . . Shapes other than plane or cylindrical, e.g. helical
- 4/80 . . . . Porous plates, e.g. sintered carriers
- 4/801 . . . . . {Sintered carriers}
- 4/803 . . . . . . {of only powdered material}
- 4/805 . . . . . . {of powdered and fibrous material}
- 4/806 . . . . . {Nonwoven fibrous fabric containing only fibres}
- 4/808 . . . . . {Foamed, spongy materials}
- 4/82 . . . Multi-step processes for manufacturing carriers for lead-acid accumulators
- 4/84 . . . . involving casting
- 4/86 . Inert electrodes with catalytic activity, e.g. for fuel cells
- 4/8605 . . {Porous electrodes}
- 4/861 . . . {with a gradient in the porosity}
- 4/8615 . . . {Bifunctional electrodes for rechargeable cells}
- 4/8621 . . . {containing only metallic or ceramic material, e.g. made by sintering or sputtering}
- 4/8626 . . . {characterised by the form}
- 4/8631 . . . . {Bipolar electrodes}
- 4/8636 . . {with a gradient in another property than porosity ([H01M 4/861](#) takes precedence)}
- 4/8642 . . . {Gradient in composition}
- 4/8647 . . {consisting of more than one material, e.g. consisting of composites}
- 4/8652 . . . {as mixture}
- 4/8657 . . . {layered}
- 4/8663 . . {Selection of inactive substances as ingredients for catalytic active masses, e.g. binders, fillers}
- 4/8668 . . . {Binders}
- 4/8673 . . . {Electrically conductive fillers}
- 2004/8678 . . {characterised by the polarity}
- 2004/8684 . . . {Negative electrodes}
- 2004/8689 . . . {Positive electrodes}
- 2004/8694 . . . {Bipolar electrodes}
- 4/88 . . Processes of manufacture
- 4/8803 . . . {Supports for the deposition of the catalytic active composition ([H01M 4/90](#) takes precedence)}
- 4/8807 . . . . {Gas diffusion layers}
- 4/881 . . . . {Electrolytic membranes}
- 4/8814 . . . . {Temporary supports, e.g. decal}
- 4/8817 . . . {Treatment of supports before application of the catalytic active composition (coated porous composites [H01M 8/0245](#))}
- 4/8821 . . . . {Wet proofing}
- 4/8825 . . . {Methods for deposition of the catalytic active composition}
- 4/8828 . . . . {Coating with slurry or ink}
- 4/8832 . . . . . {Ink jet printing}
- 4/8835 . . . . . {Screen printing}
- 4/8839 . . . . . {Painting}
- 4/8842 . . . . {Coating using a catalyst salt precursor in solution followed by evaporation and reduction of the precursor}
- 4/8846 . . . . {Impregnation}
- 4/885 . . . . . {followed by reduction of the catalyst salt precursor}
- 4/8853 . . . . {Electrodeposition}
- 4/8857 . . . . {Casting, e.g. tape casting, vacuum slip casting}
- 4/886 . . . . {Powder spraying, e.g. wet or dry powder spraying, plasma spraying}
- 4/8864 . . . . {Extrusion}
- 4/8867 . . . . {Vapour deposition}
- 4/8871 . . . . . {Sputtering}

- 4/8875 . . . {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}
- 4/8878 . . . {Treatment steps after deposition of the catalytic active composition or after shaping of the electrode being free-standing body}
- 4/8882 . . . . {Heat treatment, e.g. drying, baking}
- 4/8885 . . . . . {Sintering or firing}
- 4/8889 . . . . . {Cosintering or cofiring of a catalytic active layer with another type of layer}
- 4/8892 . . . . {Impregnation or coating of the catalyst layer, e.g. by an ionomer}
- 4/8896 . . . . {Pressing, rolling, calendering (membrane electrode assemblies [H01M 8/1004](#))}
- 4/90 . . Selection of catalytic material
- 4/9008 . . . {Organic or organo-metallic compounds}
- 4/9016 . . . {Oxides, hydroxides or oxygenated metallic salts}
- 4/9025 . . . . {Oxides specially used in fuel cell operating at high temperature, e.g. SOFC}
- 4/9033 . . . . . {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}
- 4/9041 . . . {Metals or alloys ([H01M 4/92](#) takes precedence)}
- 4/905 . . . . {specially used in fuel cell operating at high temperature, e.g. SOFC}
- 4/9058 . . . . . {of noble metals or noble-metal based alloys}
- 4/9066 . . . . . {of metal-ceramic composites or mixtures, e.g. cermets}
- 4/9075 . . . {Catalytic material supported on carriers, e.g. powder carriers ([H01M 4/8807](#), [H01M 4/881](#), [H01M 4/8814](#), [H01M 4/925](#) take precedence)}
- 4/9083 . . . . {on carbon or graphite}
- 4/9091 . . . {Unsupported catalytic particles; loose particulate catalytic materials, e.g. in fluidised state}
- 4/92 . . . Metals of platinum group ([H01M 4/94](#), [H01M 4/9058](#) take precedence)
- 4/921 . . . . {Alloys or mixtures with metallic elements}
- 4/923 . . . . {Compounds thereof with non-metallic elements}
- 4/925 . . . . {supported on carriers, e.g. powder carriers}
- 4/926 . . . . . {on carbon or graphite}
- 4/928 . . . . {Unsupported catalytic particles; loose particulate catalytic materials, e.g. in fluidised state}
- 4/94 . . Non-porous diffusion electrodes, e.g. palladium membranes, ion exchange membranes
- 4/96 . . Carbon-based electrodes
- 4/98 . . Raney-type electrodes
- 6/00 Primary cells; Manufacture thereof**
- NOTE**
- In this group, primary cells are electrochemical generators in which the cell energy is present in chemical form and is not regenerated.
- 6/005 . {Devices for making primary cells}
- 6/02 . Details (of electrodes [H01M 4/00](#); of non-active parts [H01M 50/00](#))
- 6/04 . 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}
- 6/166 . . . . {by the solute}
- 6/168 . . . . {by additives}
- 6/18 . . with solid electrolyte
- 6/181 . . . {with polymeric electrolytes}
- 6/182 . . . {with halogenide as solid electrolyte}
- 6/183 . . . . {with fluoride as solid electrolyte}
- 6/185 . . . {with oxides, hydroxides or oxysalts as solid electrolytes}
- 6/186 . . . . {Only oxysalts-containing solid electrolytes}
- 6/187 . . . {Solid electrolyte characterised by the form}
- 6/188 . . . {Processes of manufacture}
- 6/20 . . . working at high temperature (deferred-action thermal cells [H01M 6/36](#))
- 6/22 . Immobilising of electrolyte
- 6/24 . Cells comprising two different electrolytes
- 6/26 . Cells without oxidising active material, e.g. Volta cells
- 6/28 . Standard cells, e.g. Weston cells
- 6/30 . Deferred-action cells
- 6/32 . . activated through external addition of electrolyte or of electrolyte components
- 6/34 . . . Immersion cells, e.g. sea-water cells
- 6/36 . . containing electrolyte and made operational by physical means, e.g. thermal cells
- 6/38 . . . by mechanical means
- 6/385 . . . . {by insertion of electrodes}
- 6/40 . Printed batteries {, e.g. thin film batteries}
- 6/42 . Grouping of primary cells into batteries ([H01M 6/40](#) takes precedence)
- 6/425 . . {Multimode batteries, batteries with "reserve cells"}
- 6/44 . . of tubular or cup-shaped cells
- 6/46 . . of flat cells
- 6/48 . . . with bipolar electrodes
- 6/485 . . . . {Side-by-side bipolar batteries}

- 6/50 . . . Methods or arrangements for servicing or maintenance, e.g. maintaining operating temperature (constructional details of current conducting connections for detecting conditions inside cells or batteries, e.g. of voltage sensing terminals [H01M 50/569](#))

**WARNING**

Group [H01M 6/50](#) is impacted by reclassification into group [H01M 50/569](#).

Groups [H01M 6/50](#) and [H01M 50/569](#) should be considered in order to perform a complete search.

- 6/5005 . . . {Auxiliary electrodes}  
 6/5011 . . . {for several cells simultaneously or successively}  
 6/5016 . . . {Multimode utilisation}  
 6/5022 . . . {Arrangements for moving electrodes or separating elements}  
 6/5027 . . . {Dummy cells}  
 6/5033 . . . {used as charging means for another battery}  
 6/5038 . . . {Heating or cooling of cells or batteries}  
 6/5044 . . . {Cells or batteries structurally combined with cell condition indicating means}

**WARNING**

Group [H01M 6/5044](#) is incomplete pending reclassification of documents from group [H01M 50/572](#).

Group [H01M 6/5044](#) is also impacted by reclassification into group [H01M 50/569](#).

Groups [H01M 50/572](#), [H01M 6/5044](#), and [H01M 50/569](#) should be considered in order to perform a complete search.

- 6/505 . . . {Cells combined with indicating means for external visualization of the condition, e.g. by change of colour or of light intensity}

**WARNING**

Group [H01M 6/505](#) is impacted by reclassification into group [H01M 50/569](#).

Groups [H01M 6/505](#) and [H01M 50/569](#) should be considered in order to perform a complete search.

- 6/5055 . . . {End of discharge indicated by a voltage step}

**WARNING**

Group [H01M 6/5055](#) is impacted by reclassification into group [H01M 50/569](#).

Groups [H01M 6/5055](#) and [H01M 50/569](#) should be considered in order to perform a complete search.

- 6/5061 . . . {Cells combined with sound indicating means}

**WARNING**

Group [H01M 6/5061](#) is impacted by reclassification into group [H01M 50/569](#).

Groups [H01M 6/5061](#) and [H01M 50/569](#) should be considered in order to perform a complete search.

- 6/5066 . . . {Type recognition}  
 6/5072 . . . {Preserving or storing cells}

- 6/5077 . . . {Regeneration of reactants or electrolyte}  
 6/5083 . . . {Testing apparatus}  
 6/5088 . . . {Initial activation; predischARGE; Stabilisation of initial voltage}  
 2006/5094 . . . {Aspects relating to capacity ratio of electrolyte/ electrodes or anode/cathode}

- 6/52 . . . Reclaiming serviceable parts of waste cells or batteries {, e.g. recycling}

**8/00 Fuel cells; Manufacture thereof****NOTE**

Fuel cells are electrochemical generators wherein the reactants are supplied from outside

- 8/002 . . . {Shape, form of a fuel cell}  
 8/004 . . . {Cylindrical, tubular or wound}  
 8/006 . . . {Flat}  
 8/008 . . . Disposal or recycling of fuel cells  
 8/02 . . . Details (electrodes [H01M 4/86](#) - [H01M 4/98](#))  
 8/0202 . . . Collectors; Separators, e.g. bipolar separators; Interconnectors  
 8/0204 . . . . Non-porous and characterised by the material  
 8/0206 . . . . . Metals or alloys  
 8/0208 . . . . . Alloys  
 8/021 . . . . . Alloys based on iron  
 8/0213 . . . . . Gas-impermeable carbon-containing materials  
 8/0215 . . . . . Glass; Ceramic materials  
 8/0217 . . . . . Complex oxides, optionally doped, of the type  $AMO_3$ , A being an alkaline earth metal or rare earth metal and M being a metal, e.g. perovskites  
 8/0219 . . . . . {Chromium complex oxides}  
 8/0221 . . . . . Organic resins; Organic polymers  
 8/0223 . . . . . Composites  
 8/0226 . . . . . in the form of mixtures  
 8/0228 . . . . . in the form of layered or coated products  
 8/023 . . . . Porous and characterised by the material  
 8/0232 . . . . . Metals or alloys  
 8/0234 . . . . . Carbonaceous material  
 8/0236 . . . . . Glass; Ceramics; Cermets  
 8/0239 . . . . . Organic resins; Organic polymers  
 8/0241 . . . . . Composites  
 8/0243 . . . . . in the form of mixtures  
 8/0245 . . . . . in the form of layered or coated products  
 8/0247 . . . . characterised by the form (characterised by a channel configuration [H01M 8/0258](#))  
 8/025 . . . . . semicylindrical  
 8/0252 . . . . . tubular  
 8/0254 . . . . . corrugated or undulated  
 8/0256 . . . . . Vias, i.e. connectors passing through the separator material



- 8/0258 . . . characterised by the configuration of channels, e.g. by the flow field of the reactant or coolant

**WARNING**

Group [H01M 8/0258](#) is incomplete pending reclassification of documents from group [H01M 8/0267](#) and impacted by reclassification into [H01M 8/2483](#).  
Groups [H01M 8/0258](#), [H01M 8/0267](#) and [H01M 8/2483](#) should be considered in order to perform a complete search.

- 8/026 . . . . characterised by grooves, e.g. their pitch or depth

**WARNING**

Groups [H01M 8/026](#)-[H01M 8/0265](#) are incomplete pending reclassification of documents from group [H01M 8/0267](#).  
Group [H01M 8/0267](#) should be considered when searching any group of the range [H01M 8/026](#)-[H01M 8/0265](#) in order to perform a complete search.

- 8/0263 . . . . having meandering or serpentine paths

- 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

- 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}
- 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 ranges [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 8/04492](#) 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}
- 8/04641 . . . . . {of the individual fuel cell}
- 8/04649 . . . . . {of fuel cell stacks}
- 8/04656 . . . . . {of auxiliary devices, e.g. batteries, capacitors}
- 8/04664 . . . . . Failure or abnormal function
- 8/04671 . . . . . {of the individual fuel cell}
- 8/04679 . . . . . {of fuel cell stacks}
- 8/04686 . . . . . {of auxiliary devices, e.g. batteries, capacitors}
- 8/04694 . . . . . characterised by variables to be controlled
- 8/04701 . . . . . Temperature
- 8/04708 . . . . . {of fuel cell reactants}
- 8/04716 . . . . . {of fuel cell exhausts}
- 8/04723 . . . . . {of the coolant}
- 8/04731 . . . . . {of other components of a fuel cell or fuel cell stacks}
- 8/04738 . . . . . {of auxiliary devices, e.g. reformer, compressor, burner}
- 8/04746 . . . . . Pressure; Flow
- 8/04753 . . . . . {of fuel cell reactants}
- 8/04761 . . . . . {of fuel cell exhausts}
- 8/04768 . . . . . {of the coolant}
- 8/04776 . . . . . {at auxiliary devices, e.g. reformer, compressor, burner}
- 8/04783 . . . . . {Pressure differences, e.g. between anode and cathode}
- 8/04791 . . . . . Concentration; Density ([H01M 8/04828 takes precedence](#))
- 8/04798 . . . . . {of fuel cell reactants}
- 8/04805 . . . . . {of fuel cell exhausts}
- 8/04813 . . . . . {of the coolant}
- 8/0482 . . . . . {of the electrolyte}
- 8/04828 . . . . . Humidity; Water content
- 8/04835 . . . . . {of fuel cell reactants}
- 8/04843 . . . . . {of fuel cell exhausts}
- 8/0485 . . . . . {of the electrolyte}
- 8/04858 . . . . . Electric variables
- 8/04865 . . . . . {Voltage}
- 8/04873 . . . . . {of the individual fuel cell}
- 8/0488 . . . . . {of fuel cell stacks}
- 8/04888 . . . . . {of auxiliary devices, e.g. batteries, capacitors}
- 8/04895 . . . . . {Current}
- 8/04902 . . . . . {of the individual fuel cell}
- 8/0491 . . . . . {of fuel cell stacks}
- 8/04917 . . . . . {of auxiliary devices, e.g. batteries, capacitors}
- 8/04925 . . . . . {Power, energy, capacity or load}
- 8/04932 . . . . . {of the individual fuel cell}
- 8/0494 . . . . . {of fuel cell stacks}
- 8/04947 . . . . . {of auxiliary devices, e.g. batteries, capacitors}
- 8/04949 . . . . . {other electric variables, e.g. resistance or impedance}
- 8/04951 . . . . . {of the individual fuel cell}
- 8/04952 . . . . . {of fuel cell stacks}
- 8/04953 . . . . . {of auxiliary devices, e.g. batteries, capacitors}
- 8/04955 . . . . . Shut-off or shut-down of fuel cells
- 8/04992 . . . . . characterised by the implementation of mathematical or computational algorithms, e.g. feedback control loops, fuzzy logic, neural networks or artificial intelligence
- 8/06 . . . . . Combination of fuel cells with means for production of reactants or for treatment of residues ([regenerative fuel cells H01M 8/18](#))
- 8/0606 . . . . . with means for production of gaseous reactants
- 8/0612 . . . . . from carbon-containing material
- 8/0618 . . . . . {Reforming processes, e.g. autothermal, partial oxidation or steam reforming}
- 8/0625 . . . . . {in a modular combined reactor/fuel cell structure}
- 8/0631 . . . . . {Reactor construction specially adapted for combination reactor/fuel cell ([hydrogen C01B 3/00](#); [reactors for physicochemical processes B01J 19/00](#))}
- 8/0637 . . . . . Direct internal reforming at the anode of the fuel cell
- 8/0643 . . . . . {Gasification of solid fuel}
- 8/065 . . . . . by dissolution of metals or alloys; by dehydrating metallic substances
- 8/0656 . . . . . by electrochemical means ([H01M 8/065 takes precedence](#))
- 8/0662 . . . . . Treatment of gaseous reactants or gaseous residues, e.g. cleaning
- 8/0668 . . . . . Removal of carbon monoxide or carbon dioxide
- 8/0675 . . . . . {Removal of sulfur}
- 8/0681 . . . . . {Reactant purification by the use of electrochemical cells}
- 8/0687 . . . . . {Reactant purification by the use of membranes or filters}
- 8/0693 . . . . . {Treatment of the electrolyte residue, e.g. reconcentrating}
- 8/08 . . . . . Fuel cells with aqueous electrolytes
- 8/083 . . . . . Alkaline fuel cells
- 8/086 . . . . . Phosphoric acid fuel cells [PAFC]
- 8/10 . . . . . Fuel cells with solid electrolytes
- 8/1004 . . . . . characterised by membrane-electrode assemblies [MEA] ([H01M 8/12 takes precedence](#))
- 8/1006 . . . . . Corrugated, curved or wave-shaped MEA
- 8/1007 . . . . . with both reactants being gaseous or vaporised ([H01M 8/12 takes precedence](#))
- 8/1009 . . . . . with one of the reactants being liquid, solid or liquid-charged ([H01M 8/12 takes precedence](#))
- 8/1011 . . . . . Direct alcohol fuel cells [DAFC], e.g. direct methanol fuel cells [DMFC]
- 8/1013 . . . . . {Other direct alcohol fuel cells [DAFC] (DMFCs [H01M 8/1011](#))}
- 8/1016 . . . . . characterised by the electrolyte material ([H01M 8/12 takes precedence](#))
- 8/1018 . . . . . Polymeric electrolyte materials



- 8/102 . . . . characterised by the 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.
- 8/1023 . . . . having only carbon, e.g. polyarylenes, 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<sub>2</sub> or ZrO<sub>2</sub>
- 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<sub>2</sub> 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 vaporised
- 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
- 2008/1293 . . . {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
- 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 . . {comprising spaced diffusion electrodes or electrode layers with interposed electrolyte layer or electrolyte compartment}

(Frozen)

**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 . . . {External manifolded battery stock}

(Frozen)

**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](#).

Group [H01M 8/242](#), [H01M 8/2404](#), [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 8/2425](#), [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.

- 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 . . {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}

(Frozen)

**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 . . {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  
(Frozen) 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

- 8/2475 . . . . Enclosures, casings or containers of fuel cell stacks

- 8/248 . . . . Means for compression of the fuel cell stacks

- 8/2483 . . . characterised by internal manifolds

**WARNING**

Group [H01M 8/2483](#) is incomplete pending reclassification of documents from groups [H01M 8/0258](#) and [H01M 8/2465](#).

Groups [H01M 8/0258](#), [H01M 8/2465](#) and [H01M 8/2483](#) should be considered in order to perform a complete search.

- 8/2484 . . . characterised by external manifolds

**WARNING**

Group [H01M 8/2484](#) is incomplete pending reclassification of documents from groups [H01M 8/2415](#) and [H01M 8/2485](#).

Groups [H01M 8/2415](#), [H01M 8/2485](#) and [H01M 8/2484](#) should be considered in order to perform a complete search.

- 8/2485 . . . . Arrangements for sealing external manifolds; Arrangements for mounting external manifolds around a stack

**WARNING**

Group [H01M 8/2485](#) is incomplete pending reclassification of documents from group [H01M 8/2415](#) and impacted by reclassification into group [H01M 8/2484](#).

Groups [H01M 8/2415](#), [H01M 8/2485](#) and [H01M 8/2484](#) should be considered in order to perform a complete search.

- 8/249 . . comprising two or more groupings of fuel cells, e.g. modular assemblies

- 8/2495 . . . of fuel cells of different types

**10/00 Secondary cells; Manufacture thereof**

**NOTE**

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

- 10/02 . Details (of electrodes [H01M 4/00](#); of non-active parts [H01M 50/00](#))

- 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}

- 2010/0495 . . {Nanobatteries}

- 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 lithium 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<sub>2</sub> 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.
- 10/0583 . . . of accumulators with folded construction elements except wound ones, i.e. folded positive or negative electrodes or separators, e.g. with "Z"-shaped electrodes or separators
  - 10/0585 . . . of accumulators having only flat construction elements, i.e. flat positive electrodes, flat negative electrodes and flat separators
  - 10/0587 . . . of accumulators having only wound construction elements, i.e. wound positive electrodes, wound negative electrodes and wound separators
  - 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 (constructional details of current conducting connections for detecting conditions inside cells or batteries, e.g. of voltage sensing terminals H01M 50/569)

**WARNING**

Group [H01M 10/48](#) is impacted by reclassification into group [H01M 50/569](#).

Groups [H01M 10/48](#) and [H01M 50/569](#) should be considered in order to perform a complete search.

- 10/482 . . . {for several batteries or cells simultaneously or sequentially}

**WARNING**

Group [H01M 10/482](#) is impacted by reclassification into group [H01M 50/569](#).

Groups [H01M 10/482](#) and [H01M 50/569](#) should be considered in order to perform a complete search.

- 10/484 . . . {for measuring electrolyte level, electrolyte density or electrolyte conductivity}

**WARNING**

Group [H01M 10/484](#) is impacted by reclassification into group [H01M 50/569](#).

Groups [H01M 10/484](#) and [H01M 50/569](#) should be considered in order to perform a complete search.

- 10/486 . . . {for measuring temperature}

**WARNING**

Group [H01M 10/486](#) is impacted by reclassification into group [H01M 50/569](#).

Groups [H01M 10/486](#) and [H01M 50/569](#) should be considered in order to perform a complete search.

- 10/488 . . . {Cells or batteries combined with indicating means for external visualization of the condition, e.g. by change of colour or of light density}

**WARNING**

Group [H01M 10/488](#) is impacted by reclassification into group [H01M 50/569](#).

Groups [H01M 10/488](#) and [H01M 50/569](#) should be considered in order to perform a complete search.

- 10/52 . . Removing gases inside the secondary cell, e.g. by absorption (vent plugs or other mechanical arrangements for facilitating escape of gases H01M 50/30)
- 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 (means for preventing undesired use or discharge H01M 50/572)
- 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.

- 12/005 (Frozen) . {composed of a half-cell of the capacitor type and of a half-cell of the primary or secondary battery type (hybrid capacitors [H01G 9/155](#))}

**WARNING**

Group [H01M 12/005](#) is no longer used for the classification of documents as of January 1, 2019.

The content of this groups 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 electrodes [H01M 4/00](#); of non-active parts [H01M 50/00](#))
- 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 40/38](#).

- 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}

**50/00 Constructional details or processes of manufacture of the non-active parts of electrochemical cells other than fuel cells, e.g. hybrid cells**

- 50/10 . Primary casings, jackets or wrappings of a single cell or a single battery

**WARNING**

Group [H01M 50/10](#) is impacted by reclassification into groups [H01M 50/102](#), [H01M 50/103](#), [H01M 50/105](#), [H01M 50/107](#), [H01M 50/109](#), [H01M 50/11](#), [H01M 50/14](#), [H01M 50/141](#), [H01M 50/143](#), and [H01M 50/145](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/102 . . characterised by their shape or physical structure

**WARNING**

Groups [H01M 50/102](#), [H01M 50/103](#), [H01M 50/105](#), [H01M 50/107](#), [H01M 50/109](#), and [H01M 50/11](#) are incomplete pending reclassification of documents from group [H01M 50/10](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/103 . . . prismatic or rectangular ([H01M 50/109](#), [H01M 50/11](#) take precedence)

- 50/105 . . . Pouches or flexible bags

- 50/107 . . . having curved cross-section, e.g. round or elliptic ([H01M 50/103](#), [H01M 50/109](#), [H01M 50/11](#) take precedence)

- 50/109 . . . of button or coin shape

- 50/11 . . . having a structure in the form of a chip

- 50/112 . . . Monobloc comprising multiple compartments

**WARNING**

Group [H01M 50/112](#) is impacted by reclassification into group [H01M 50/114](#).

Groups [H01M 50/112](#) and [H01M 50/114](#) should be considered in order to perform a complete search.

- 50/114 . . . . specially adapted for lead-acid cells

**WARNING**

Group [H01M 50/114](#) is incomplete pending reclassification of documents from group [H01M 50/112](#).

Groups [H01M 50/112](#) and [H01M 50/114](#) should be considered in order to perform a complete search.

- 50/116 . . characterised by the material

**WARNING**

Group [H01M 50/116](#) is impacted by reclassification into groups [H01M 50/117](#), [H01M 50/119](#), [H01M 50/121](#), [H01M 50/122](#), [H01M 50/124](#), [H01M 50/126](#), [H01M 50/128](#), [H01M 50/129](#), [H01M 50/131](#), [H01M 50/133](#), [H01M 50/134](#), [H01M 50/136](#), [H01M 50/14](#), [H01M 50/141](#), [H01M 50/143](#), and [H01M 50/145](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/117 . . . Inorganic material

**WARNING**

Groups [H01M 50/117](#) and [H01M 50/119](#) are incomplete pending reclassification of documents from group [H01M 50/116](#).

Groups [H01M 50/116](#), [H01M 50/117](#), and [H01M 50/119](#) should be considered in order to perform a complete search.

- 50/119 . . . . Metals

- 50/121 . . . Organic material

**WARNING**

Group [H01M 50/121](#) is incomplete pending reclassification of documents from group [H01M 50/116](#).

Groups [H01M 50/116](#) and [H01M 50/121](#) should be considered in order to perform a complete search.

- 50/122 . . . Composite material consisting of a mixture of organic and inorganic materials

**WARNING**

Group [H01M 50/122](#) is incomplete pending reclassification of documents from group [H01M 50/116](#).

Groups [H01M 50/116](#) and [H01M 50/122](#) should be considered in order to perform a complete search.

- 50/124 . . . having a layered structure

**WARNING**

Groups [H01M 50/124](#), [H01M 50/126](#), [H01M 50/128](#), and [H01M 50/129](#) are incomplete pending reclassification of documents from group [H01M 50/116](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/1243 . . . . {characterised by the internal coating on the casing}

- 50/1245 . . . . {characterised by the external coating on the casing}

- 50/126 . . . . comprising three or more layers

- 50/128 . . . . with two or more layers of only inorganic material

- 50/129 . . . . with two or more layers of only organic material

- 50/131 . . characterised by physical properties, e.g. gas-permeability or size
- WARNING**
- Groups [H01M 50/131](#) - [H01M 50/136](#) are incomplete pending reclassification of documents from group [H01M 50/116](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 50/133 . . . Thickness
- 50/134 . . . Hardness
- 50/136 . . . Flexibility or foldability
- 50/138 . . adapted for specific cells, e.g. electrochemical cells operating at high temperature
- 50/1385 . . . {Hybrid cells}
- 50/14 . . for protecting against damage caused by external factors
- WARNING**
- Groups [H01M 50/14](#) - [H01M 50/145](#) are incomplete pending reclassification of documents from groups [H01M 50/10](#) and [H01M 50/116](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 50/141 . . . for protecting against humidity
- 50/143 . . . Fireproof; Explosion-proof
- 50/145 . . . for protecting against corrosion
- 50/147 . . Lids or covers
- WARNING**
- Group [H01M 50/147](#) is impacted by reclassification into groups [H01M 50/591](#) and [H01M 50/593](#).
- Groups [H01M 50/147](#), [H01M 50/591](#), and [H01M 50/593](#) should be considered in order to perform a complete search.
- 50/148 . . . characterised by their shape
- WARNING**
- Group [H01M 50/148](#) is impacted by reclassification into groups [H01M 50/15](#), [H01M 50/152](#), and [H01M 50/153](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 50/15 . . . . for prismatic or rectangular cells ([H01M 50/153](#) takes precedence)
- WARNING**
- Group [H01M 50/15](#) is incomplete pending reclassification of documents from group [H01M 50/148](#).
- Groups [H01M 50/148](#) and [H01M 50/15](#) should be considered in order to perform a complete search.

- 50/152 . . . . for cells having curved cross-section, e.g. round or elliptic ([H01M 50/15](#), [H01M 50/153](#) take precedence)
- WARNING**
- Group [H01M 50/152](#) is incomplete pending reclassification of documents from group [H01M 50/148](#).
- Groups [H01M 50/148](#) and [H01M 50/152](#) should be considered in order to perform a complete search.
- 50/153 . . . . for button or coin cells
- WARNING**
- Group [H01M 50/153](#) is incomplete pending reclassification of documents from group [H01M 50/148](#).
- Groups [H01M 50/148](#) and [H01M 50/153](#) should be considered in order to perform a complete search.
- 50/1535 . . . . {adapted for specific cells, e.g. electrochemical cells operating at high temperature}
- 50/1537 . . . . . {for hybrid cells}
- 50/154 . . . . {Lid or cover comprising an axial bore for receiving a central current collector}
- 50/155 . . . characterised by the material
- WARNING**
- Group [H01M 50/155](#) is impacted by reclassification into groups [H01M 50/157](#), [H01M 50/159](#), [H01M 50/16](#), [H01M 50/162](#), [H01M 50/164](#), [H01M 50/591](#), and [H01M 50/593](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 50/157 . . . . Inorganic material
- WARNING**
- Groups [H01M 50/157](#) and [H01M 50/159](#) are incomplete pending reclassification of documents from group [H01M 50/155](#).
- Groups [H01M 50/155](#), [H01M 50/157](#), and [H01M 50/159](#) should be considered in order to perform a complete search.
- 50/159 . . . . . Metals
- 50/16 . . . . Organic material
- WARNING**
- Group [H01M 50/16](#) is incomplete pending reclassification of documents from group [H01M 50/155](#).
- Groups [H01M 50/155](#) and [H01M 50/16](#) should be considered in order to perform a complete search.

- 50/162 . . . . Composite material consisting of a mixture of organic and inorganic materials

**WARNING**

Group [H01M 50/162](#) is incomplete pending reclassification of documents from group [H01M 50/155](#).

Groups [H01M 50/155](#) and [H01M 50/162](#) should be considered in order to perform a complete search.

- 50/164 . . . . having a layered structure

**WARNING**

Group [H01M 50/164](#) is incomplete pending reclassification of documents from group [H01M 50/155](#).

Groups [H01M 50/155](#) and [H01M 50/164](#) should be considered in order to perform a complete search.

- 50/166 . . . . characterised by the methods of assembling casings with lids

**WARNING**

Group [H01M 50/166](#) is impacted by reclassification into groups [H01M 50/167](#), [H01M 50/169](#), and [H01M 50/171](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/167 . . . . by crimping

**WARNING**

Group [H01M 50/167](#) is incomplete pending reclassification of documents from group [H01M 50/166](#).

Groups [H01M 50/166](#) and [H01M 50/167](#) should be considered in order to perform a complete search.

- 50/169 . . . . by welding, brazing or soldering

**WARNING**

Group [H01M 50/169](#) is incomplete pending reclassification of documents from group [H01M 50/166](#).

Groups [H01M 50/166](#) and [H01M 50/169](#) should be considered in order to perform a complete search.

- 50/171 . . . . using adhesives or sealing agents

**WARNING**

Group [H01M 50/171](#) is incomplete pending reclassification of documents from group [H01M 50/166](#).

Groups [H01M 50/166](#) and [H01M 50/171](#) should be considered in order to perform a complete search.

- 50/172 . . Arrangements of electric connectors penetrating the casing

**WARNING**

Group [H01M 50/172](#) is impacted by reclassification into groups [H01M 50/174](#), [H01M 50/176](#), [H01M 50/178](#), [H01M 50/179](#), and [H01M 50/181](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/174 . . . . adapted for the shape of the cells

**WARNING**

Groups [H01M 50/174](#), [H01M 50/176](#), [H01M 50/178](#), [H01M 50/179](#), and [H01M 50/181](#) are incomplete pending reclassification of documents from group [H01M 50/172](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/176 . . . . for prismatic or rectangular cells ([H01M 50/181](#) takes precedence)

- 50/178 . . . . for pouch or flexible bag cells

- 50/179 . . . . for cells having curved cross-section, e.g. round or elliptic ([H01M 50/176](#), [H01M 50/181](#) take precedence)

- 50/181 . . . . for button or coin cells

- 50/182 . . . . {for cells with a collector centrally disposed in the active mass, e.g. Leclanché cells}

- 50/183 . . Sealing members

**WARNING**

Group [H01M 50/183](#) is impacted by reclassification into groups [H01M 50/184](#), [H01M 50/186](#), [H01M 50/188](#), [H01M 50/19](#), [H01M 50/191](#), [H01M 50/193](#), [H01M 50/195](#), [H01M 50/197](#), and [H01M 50/198](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/184 . . . . characterised by their shape or structure

**WARNING**

Group [H01M 50/184](#) is incomplete pending reclassification of documents from group [H01M 50/183](#).

Groups [H01M 50/183](#) and [H01M 50/184](#) should be considered in order to perform a complete search.

- 50/186 . . . . characterised by the disposition of the sealing members

**WARNING**

Groups [H01M 50/186](#) and [H01M 50/188](#) are incomplete pending reclassification of documents from group [H01M 50/183](#).

Groups [H01M 50/183](#), [H01M 50/186](#), and [H01M 50/188](#) should be considered in order to perform a complete search.



- 50/188 . . . . the sealing members being arranged between the lid and terminal
- 50/19 . . . characterised by the material

**WARNING**

Groups [H01M 50/19](#) - [H01M 50/198](#) are incomplete pending reclassification of documents from group [H01M 50/183](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/191 . . . . Inorganic material
- 50/193 . . . . Organic material
- 50/195 . . . . Composite material consisting of a mixture of organic and inorganic materials
- 50/197 . . . . having a layered structure
- 50/198 . . . . characterised by physical properties, e.g. adhesiveness or hardness
- 50/20 . Mountings; Secondary casings or frames; Racks, modules or packs; Suspension devices; Shock absorbers; Transport or carrying devices; Holders (structural combination of accumulators with charging apparatus [H01M 10/46](#))

**WARNING**

Group [H01M 50/20](#) is impacted by reclassification into groups [H01M 50/202](#), [H01M 50/204](#), [H01M 50/207](#), [H01M 50/209](#), [H01M 50/211](#), [H01M 50/213](#), [H01M 50/216](#), [H01M 50/218](#), [H01M 50/22](#), [H01M 50/222](#), [H01M 50/224](#), [H01M 50/227](#), [H01M 50/229](#), [H01M 50/231](#), [H01M 50/233](#), [H01M 50/236](#), [H01M 50/238](#), [H01M 50/24](#), [H01M 50/242](#), [H01M 50/244](#), [H01M 50/247](#), [H01M 50/249](#), [H01M 50/251](#), [H01M 50/253](#), [H01M 50/262](#), [H01M 50/264](#), [H01M 50/267](#), [H01M 50/269](#), [H01M 50/271](#), [H01M 50/273](#), [H01M 50/276](#), [H01M 50/278](#), [H01M 50/28](#), [H01M 50/282](#), [H01M 50/284](#), [H01M 50/287](#), [H01M 50/289](#), [H01M 50/291](#), [H01M 50/293](#), [H01M 50/296](#), [H01M 50/298](#), and [B60L 50/64](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/202 . . Casings or frames around the primary casing of a single cell or a single battery

**WARNING**

Group [H01M 50/202](#) is incomplete pending reclassification of documents from group [H01M 50/20](#).

Groups [H01M 50/20](#) and [H01M 50/202](#) should be considered in order to perform a complete search.

- 50/204 . . Racks, modules or packs for multiple batteries or multiple cells

**WARNING**

Group [H01M 50/204](#) is incomplete pending reclassification of documents from group [H01M 50/20](#).

Groups [H01M 50/20](#) and [H01M 50/204](#) should be considered in order to perform a complete search.

- 50/207 . . . characterised by their shape

**WARNING**

Group [H01M 50/207](#) is incomplete pending reclassification of documents from group [H01M 50/20](#).

Groups [H01M 50/20](#) and [H01M 50/207](#) should be considered in order to perform a complete search.

- 50/209 . . . . adapted for prismatic or rectangular cells ([H01M 50/216](#) takes precedence)

**WARNING**

Group [H01M 50/209](#) is incomplete pending reclassification of documents from group [H01M 50/20](#).

Group [H01M 50/209](#) is also impacted by reclassification into group [H01M 50/211](#).

Groups [H01M 50/20](#), [H01M 50/209](#), and [H01M 50/211](#) should be considered in order to perform a complete search.

- 50/211 . . . . adapted for pouch cells

**WARNING**

Group [H01M 50/211](#) is incomplete pending reclassification of documents from groups [H01M 50/20](#) and [H01M 50/209](#).

Groups [H01M 50/20](#), [H01M 50/209](#), and [H01M 50/211](#) should be considered in order to perform a complete search.

- 50/213 . . . . adapted for cells having curved cross-section, e.g. round or elliptic ([H01M 50/209](#), [H01M 50/216](#) take precedence)

**WARNING**

Group [H01M 50/213](#) is incomplete pending reclassification of documents from group [H01M 50/20](#).

Groups [H01M 50/20](#) and [H01M 50/213](#) should be considered in order to perform a complete search.

- 50/216 . . . . adapted for button or coin cells

**WARNING**

Group [H01M 50/216](#) is incomplete pending reclassification of documents from group [H01M 50/20](#).

Groups [H01M 50/20](#) and [H01M 50/216](#) should be considered in order to perform a complete search.

- 50/218 . . characterised by the material  
**WARNING**  
 Groups [H01M 50/218](#) - [H01M 50/231](#) are incomplete pending reclassification of documents from group [H01M 50/20](#).  
 All groups listed in this Warning should be considered in order to perform a complete search.
- 50/22 . . . of the casings or racks  
 50/222 . . . . Inorganic material  
 50/224 . . . . . Metals  
 50/227 . . . . Organic material  
 50/229 . . . . Composite material consisting of a mixture of organic and inorganic materials  
 50/231 . . . . having a layered structure  
 50/233 . . characterised by physical properties of casings or racks, e.g. dimensions  
**WARNING**  
 Groups [H01M 50/233](#) - [H01M 50/242](#) are incomplete pending reclassification of documents from group [H01M 50/20](#).  
 All groups listed in this Warning should be considered in order to perform a complete search.
- 50/236 . . . Hardness  
 50/238 . . . Flexibility or foldability  
 50/24 . . . adapted for protecting batteries from their environment, e.g. from corrosion ([thermal insulation H01M 10/658](#))  
 50/242 . . . adapted for protecting batteries against vibrations, collision impact or swelling  
 50/244 . . Secondary casings; Racks; Suspension devices; Carrying devices; Holders characterised by their mounting method  
**WARNING**  
 Group [H01M 50/244](#) is incomplete pending reclassification of documents from group [H01M 50/20](#).  
 Groups [H01M 50/20](#) and [H01M 50/244](#) should be considered in order to perform a complete search.
- 50/247 . . specially adapted for portable devices, e.g. mobile phones, computers, hand tools or pacemakers  
**WARNING**  
 Group [H01M 50/247](#) is incomplete pending reclassification of documents from group [H01M 50/20](#).  
 Groups [H01M 50/20](#) and [H01M 50/247](#) should be considered in order to perform a complete search.
- 50/249 . . specially adapted for aircraft or vehicles, e.g. cars or trains ([constructional details of batteries specially adapted for electric vehicles B60L 50/64](#))  
**WARNING**  
 Group [H01M 50/249](#) is incomplete pending reclassification of documents from group [H01M 50/20](#).  
 Groups [H01M 50/20](#) and [H01M 50/249](#) should be considered in order to perform a complete search.
- 50/251 . . specially adapted for stationary devices, e.g. power plant buffering or backup power supplies  
**WARNING**  
 Group [H01M 50/251](#) is incomplete pending reclassification of documents from group [H01M 50/20](#).  
 Groups [H01M 50/20](#) and [H01M 50/251](#) should be considered in order to perform a complete search.
- 50/253 . . adapted for specific cells, e.g. electrochemical cells operating at high temperature  
**WARNING**  
 Group [H01M 50/253](#) is incomplete pending reclassification of documents from group [H01M 50/20](#).  
 Groups [H01M 50/20](#) and [H01M 50/253](#) should be considered in order to perform a complete search.
- 50/256 . . Carrying devices, e.g. belts  
 50/258 . . Modular batteries; Casings provided with means for assembling  
 50/26 . . . Assemblies sealed to each other in a non-detachable manner  
 50/262 . . with fastening means, e.g. locks  
**WARNING**  
 Groups [H01M 50/262](#) and [H01M 50/264](#) are incomplete pending reclassification of documents from group [H01M 50/20](#).  
 Groups [H01M 50/20](#), [H01M 50/262](#), and [H01M 50/264](#) should be considered in order to perform a complete search.
- 50/264 . . . for cells or batteries, e.g. straps, tie rods or peripheral frames  
 50/267 . . having means for adapting to batteries or cells of different types or different sizes  
**WARNING**  
 Group [H01M 50/267](#) is incomplete pending reclassification of documents from group [H01M 50/20](#).  
 Groups [H01M 50/20](#) and [H01M 50/267](#) should be considered in order to perform a complete search.

- 50/269 . . Mechanical means for varying the arrangement of batteries or cells for different uses, e.g. for changing the number of batteries or for switching between series and parallel wiring ([methods or arrangements for servicing or maintenance H01M 6/50, H01M 10/42](#))
- WARNING**
- Group [H01M 50/269](#) is incomplete pending reclassification of documents from group [H01M 50/20](#).
- Groups [H01M 50/20](#) and [H01M 50/269](#) should be considered in order to perform a complete search.
- 50/271 . . Lids or covers for the racks or secondary casings
- WARNING**
- Groups [H01M 50/271](#) - [H01M 50/282](#) are incomplete pending reclassification of documents from group [H01M 50/20](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 50/273 . . . characterised by the material
- 50/276 . . . . Inorganic material
- 50/278 . . . . Organic material
- 50/28 . . . . Composite material consisting of a mixture of organic and inorganic materials
- 50/282 . . . . having a layered structure
- 50/284 . . with incorporated circuit boards, e.g. printed circuit boards [PCB]
- WARNING**
- Groups [H01M 50/284](#) and [H01M 50/287](#) are incomplete pending reclassification of documents from group [H01M 50/20](#).
- Groups [H01M 50/20](#), [H01M 50/284](#), and [H01M 50/287](#) should be considered in order to perform a complete search.
- 50/287 . . . Fixing of circuit boards to lids or covers
- 50/289 . . characterised by spacing elements or positioning means within frames, racks or packs ([spacing elements inside cells other than separators, membranes or diaphragms H01M 50/471](#))
- WARNING**
- Groups [H01M 50/289](#) - [H01M 50/293](#) are incomplete pending reclassification of documents from group [H01M 50/20](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 50/291 . . . characterised by their shape
- 50/293 . . . characterised by the material
- 50/296 . . characterised by terminals of battery packs ([terminals of batteries H01M 50/543](#))
- WARNING**
- Group [H01M 50/296](#) is incomplete pending reclassification of documents from groups [H01M 50/20](#) and [H01M 50/543](#).
- Groups [H01M 50/20](#), [H01M 50/543](#), and [H01M 50/296](#) should be considered in order to perform a complete search.
- 50/298 . . characterised by the wiring of battery packs
- WARNING**
- Group [H01M 50/298](#) is incomplete pending reclassification of documents from group [H01M 50/20](#).
- Groups [H01M 50/20](#) and [H01M 50/298](#) should be considered in order to perform a complete search.
- 50/30 . . Arrangements for facilitating escape of gases
- 50/308 . . Detachable arrangements, e.g. detachable vent plugs or plug systems
- 50/317 . . Re-sealable arrangements
- 50/325 . . . comprising deformable valve members, e.g. elastic or flexible valve members
- 50/333 . . . . Spring-loaded vent valves
- 50/342 . . Non-re-sealable arrangements
- 50/3425 . . . {in the form of rupturable membranes or weakened parts, e.g. pierced with the aid of a sharp member}
- 50/35 . . Gas exhaust passages comprising elongated, tortuous or labyrinth-shaped exhaust passages
- WARNING**
- Group [H01M 50/35](#) is impacted by reclassification into groups [H01M 50/358](#) and [H01M 50/367](#).
- Groups [H01M 50/35](#), [H01M 50/358](#), and [H01M 50/367](#) should be considered in order to perform a complete search.
- 50/358 . . . External gas exhaust passages located on the battery cover or case
- WARNING**
- Group [H01M 50/358](#) is incomplete pending reclassification of documents from group [H01M 50/35](#).
- Groups [H01M 50/35](#) and [H01M 50/358](#) should be considered in order to perform a complete search.
- 50/367 . . . Internal gas exhaust passages forming part of the battery cover or case; Double cover vent systems
- WARNING**
- Group [H01M 50/367](#) is incomplete pending reclassification of documents from group [H01M 50/35](#).
- Groups [H01M 50/35](#) and [H01M 50/367](#) should be considered in order to perform a complete search.

- 50/375 . . Vent means sensitive to or responsive to temperature
- 50/383 . . Flame arresting or ignition-preventing means
- 50/392 . . with means for neutralising or absorbing electrolyte; with means for preventing leakage of electrolyte through vent holes
- 50/394 . . {Gas-pervious parts or elements}
- 50/40 . Separators; Membranes; Diaphragms; Spacing elements inside cells

**WARNING**

Group [H01M 50/40](#) is impacted by reclassification into groups [H01M 50/471](#), [H01M 50/474](#), [H01M 50/477](#), [H01M 50/48](#), [H01M 50/483](#), [H01M 50/486](#), [H01M 50/489](#), [H01M 50/491](#), [H01M 50/494](#), and [H01M 50/497](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/403 . . Manufacturing processes of separators, membranes or diaphragms

**WARNING**

Group [H01M 50/403](#) is impacted by reclassification into group [H01M 50/406](#).

Groups [H01M 50/403](#) and [H01M 50/406](#) should be considered in order to perform a complete search.

- 50/406 . . . Moulding; Embossing; Cutting

**WARNING**

Group [H01M 50/406](#) is incomplete pending reclassification of documents from group [H01M 50/403](#).

Groups [H01M 50/403](#) and [H01M 50/406](#) should be considered in order to perform a complete search.

- 50/409 . . Separators, membranes or diaphragms characterised by the material

**WARNING**

Group [H01M 50/409](#) is impacted by reclassification into groups [H01M 50/443](#), [H01M 50/489](#), [H01M 50/491](#), [H01M 50/494](#), and [H01M 50/497](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/411 . . . Organic material

**WARNING**

Group [H01M 50/411](#) is impacted by reclassification into groups [H01M 50/414](#), [H01M 50/417](#), [H01M 50/42](#), [H01M 50/423](#), [H01M 50/426](#), [H01M 50/429](#), [H01M 50/489](#), [H01M 50/491](#), [H01M 50/494](#), and [H01M 50/497](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/414 . . . . Synthetic resins, e.g. thermoplastics or thermosetting resins

**WARNING**

Groups [H01M 50/414](#) - [H01M 50/426](#) are incomplete pending reclassification of documents from group [H01M 50/411](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/417 . . . . Polyolefins
- 50/42 . . . . Acrylic resins
- 50/423 . . . . Polyamide resins
- 50/426 . . . . Fluorocarbon polymers
- 50/429 . . . . Natural polymers

**WARNING**

Group [H01M 50/429](#) is incomplete pending reclassification of documents from group [H01M 50/411](#).

Groups [H01M 50/411](#) and [H01M 50/429](#) should be considered in order to perform a complete search.

- 50/4295 . . . . {Natural cotton, cellulose or wood}
- 50/431 . . . Inorganic material

**WARNING**

Group [H01M 50/431](#) is impacted by reclassification into groups [H01M 50/434](#), [H01M 50/437](#), [H01M 50/489](#), [H01M 50/491](#), [H01M 50/494](#), and [H01M 50/497](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/434 . . . . Ceramics

**WARNING**

Groups [H01M 50/434](#) and [H01M 50/437](#) are incomplete pending reclassification of documents from group [H01M 50/431](#).

Groups [H01M 50/431](#), [H01M 50/434](#), and [H01M 50/437](#) should be considered in order to perform a complete search.

- 50/437 . . . . Glass
- 50/44 . . . Fibrous material
- 50/443 . . . Particulate material

**WARNING**

Group [H01M 50/443](#) is incomplete pending reclassification of documents from group [H01M 50/409](#).

Groups [H01M 50/409](#) and [H01M 50/443](#) should be considered in order to perform a complete search.

- 50/446 . . . Composite material consisting of a mixture of organic and inorganic materials

- 50/449 . . . having a layered structure

**WARNING**

Group [H01M 50/449](#) is impacted by reclassification into groups [H01M 50/451](#), [H01M 50/454](#), [H01M 50/457](#), [H01M 50/489](#), [H01M 50/491](#), [H01M 50/494](#), and [H01M 50/497](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/451 . . . . comprising layers of only organic material and layers containing inorganic material

**WARNING**

Group [H01M 50/451](#) is incomplete pending reclassification of documents from group [H01M 50/449](#).

Groups [H01M 50/449](#) and [H01M 50/451](#) should be considered in order to perform a complete search.

- 50/454 . . . . comprising a non-fibrous layer and a fibrous layer superimposed on one another

**WARNING**

Group [H01M 50/454](#) is incomplete pending reclassification of documents from group [H01M 50/449](#).

Groups [H01M 50/449](#) and [H01M 50/454](#) should be considered in order to perform a complete search.

- 50/457 . . . . comprising three or more layers

**WARNING**

Group [H01M 50/457](#) is incomplete pending reclassification of documents from group [H01M 50/449](#).

Groups [H01M 50/449](#) and [H01M 50/457](#) should be considered in order to perform a complete search.

- 50/46 . . Separators, membranes or diaphragms characterised by their combination with electrodes

- 50/461 . . . {with adhesive layers between electrodes and separators}

- 50/463 . . Separators, membranes or diaphragms characterised by their shape

**WARNING**

Group [H01M 50/463](#) is impacted by reclassification into groups [H01M 50/466](#) and [H01M 50/469](#).

Groups [H01M 50/463](#), [H01M 50/466](#), and [H01M 50/469](#) should be considered in order to perform a complete search.

- 50/466 . . . U-shaped, bag-shaped or folded

**WARNING**

Group [H01M 50/466](#) is incomplete pending reclassification of documents from group [H01M 50/463](#).

Groups [H01M 50/463](#) and [H01M 50/466](#) should be considered in order to perform a complete search.

- 50/469 . . . tubular or cylindrical

**WARNING**

Group [H01M 50/469](#) is incomplete pending reclassification of documents from group [H01M 50/463](#).

Groups [H01M 50/463](#) and [H01M 50/469](#) should be considered in order to perform a complete search.

- 50/471 . . Spacing elements inside cells other than separators, membranes or diaphragms (for preventing incorrect contact inside or outside batteries [H01M 50/584](#)); Manufacturing processes thereof

**WARNING**

Groups [H01M 50/471](#) - [H01M 50/486](#) are incomplete pending reclassification of documents from group [H01M 50/40](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/474 . . . characterised by their position inside the cells

- 50/477 . . . characterised by their shape

- 50/48 . . . characterised by the material

- 50/483 . . . . Inorganic material

- 50/486 . . . . Organic material

- 50/489 . . Separators, membranes, diaphragms or spacing elements inside the cells, characterised by their physical properties, e.g. swelling degree, hydrophilicity or shut down properties

**WARNING**

Groups [H01M 50/489](#) - [H01M 50/497](#) are incomplete pending reclassification of documents from groups [H01M 50/40](#), [H01M 50/409](#), [H01M 50/411](#), [H01M 50/431](#), and [H01M 50/449](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/491 . . . Porosity

- 50/494 . . . Tensile strength

- 50/497 . . . Ionic conductivity

- 50/50 . . Current conducting connections for cells or batteries

**WARNING**

Group [H01M 50/50](#) is impacted by reclassification into group [H01M 50/569](#).

Groups [H01M 50/50](#) and [H01M 50/569](#) should be considered in order to perform a complete search.



- 50/502 . . Interconnectors for connecting terminals of adjacent batteries; Interconnectors for connecting cells outside a battery casing
- WARNING**
- Group [H01M 50/502](#) is impacted by reclassification into groups [H01M 50/503](#), [H01M 50/505](#), [H01M 50/507](#), [H01M 50/509](#), [H01M 50/51](#), [H01M 50/512](#), [H01M 50/514](#), [H01M 50/516](#), [H01M 50/517](#), [H01M 50/519](#), [H01M 50/521](#), [H01M 50/522](#), [H01M 50/524](#), [H01M 50/526](#), and [H01M 50/569](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 50/503 . . . characterised by the shape of the interconnectors
- WARNING**
- Group [H01M 50/503](#) is incomplete pending reclassification of documents from group [H01M 50/502](#).
- Groups [H01M 50/502](#) and [H01M 50/503](#) should be considered in order to perform a complete search.
- 50/505 . . . comprising a single busbar
- WARNING**
- Group [H01M 50/505](#) is incomplete pending reclassification of documents from group [H01M 50/502](#).
- Groups [H01M 50/502](#) and [H01M 50/505](#) should be considered in order to perform a complete search.
- 50/507 . . . comprising an arrangement of two or more busbars within a container structure, e.g. busbar modules
- WARNING**
- Group [H01M 50/507](#) is incomplete pending reclassification of documents from group [H01M 50/502](#).
- Groups [H01M 50/502](#) and [H01M 50/507](#) should be considered in order to perform a complete search.
- 50/509 . . . characterised by the type of connection, e.g. mixed connections
- WARNING**
- Groups [H01M 50/509](#) - [H01M 50/512](#) are incomplete pending reclassification of documents from group [H01M 50/502](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 50/51 . . . . Connection only in series
- 50/512 . . . . Connection only in parallel
- 50/514 . . . Methods for interconnecting adjacent batteries or cells
- WARNING**
- Groups [H01M 50/514](#) - [H01M 50/517](#) are incomplete pending reclassification of documents from group [H01M 50/502](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 50/516 . . . . by welding, soldering or brazing
- 50/517 . . . . by fixing means, e.g. screws, rivets or bolts
- 50/519 . . . comprising printed circuit boards [PCB]
- WARNING**
- Group [H01M 50/519](#) is incomplete pending reclassification of documents from group [H01M 50/502](#).
- Groups [H01M 50/502](#) and [H01M 50/519](#) should be considered in order to perform a complete search.
- 50/521 . . . characterised by the material
- WARNING**
- Groups [H01M 50/521](#) - [H01M 50/526](#) are incomplete pending reclassification of documents from group [H01M 50/502](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 50/522 . . . . Inorganic material
- 50/524 . . . . Organic material
- 50/526 . . . . having a layered structure
- 50/528 . . Fixed electrical connections, i.e. not intended for disconnection
- 50/529 . . . Intercell connections through partitions, e.g. in a battery casing
- 50/531 . . Electrode connections inside a battery casing
- WARNING**
- Group [H01M 50/531](#) is impacted by reclassification into groups [H01M 50/533](#), [H01M 50/534](#), and [H01M 50/536](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 50/533 . . . characterised by the shape of the leads or tabs
- WARNING**
- Group [H01M 50/533](#) is incomplete pending reclassification of documents from groups [H01M 50/531](#), [H01M 50/538](#), [H01M 50/54](#), and [H01M 50/541](#).
- All groups listed in this Warning should be considered in order to perform a complete search.

- 50/534 . . . characterised by the material of the leads or tabs

**WARNING**

Group [H01M 50/534](#) is incomplete pending reclassification of documents from groups [H01M 50/531](#), [H01M 50/538](#), [H01M 50/54](#), and [H01M 50/541](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/536 . . . characterised by the method of fixing the leads to the electrodes, e.g. by welding

**WARNING**

Group [H01M 50/536](#) is incomplete pending reclassification of documents from groups [H01M 50/531](#), [H01M 50/538](#), [H01M 50/54](#), and [H01M 50/541](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/538 . . . Connection of several leads or tabs of wound or folded electrode stacks

**WARNING**

Group [H01M 50/538](#) is impacted by reclassification into groups [H01M 50/533](#), [H01M 50/534](#), and [H01M 50/536](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/54 . . . Connection of several leads or tabs of plate-like electrode stacks, e.g. electrode pole straps or bridges

**WARNING**

Group [H01M 50/54](#) is impacted by reclassification into groups [H01M 50/533](#), [H01M 50/534](#), and [H01M 50/536](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/541 . . . . for lead-acid accumulators

**WARNING**

Group [H01M 50/541](#) is impacted by reclassification into groups [H01M 50/533](#), [H01M 50/534](#), and [H01M 50/536](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/543 . . Terminals

**WARNING**

Group [H01M 50/543](#) is impacted by reclassification into groups [H01M 50/547](#), [H01M 50/548](#), [H01M 50/55](#), [H01M 50/552](#), [H01M 50/553](#), [H01M 50/559](#), [H01M 50/562](#), [H01M 50/564](#), [H01M 50/566](#), [H01M 50/567](#), [H01M 50/569](#), and [H01M 50/296](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/545 . . . formed by the casing of the cells (cup shaped terminals adapted for cells having curved cross-section [H01M 50/56](#))

- 50/547 . . . characterised by the disposition of the terminals on the cells

**WARNING**

Groups [H01M 50/547](#) - [H01M 50/55](#) are incomplete pending reclassification of documents from groups [H01M 50/543](#), [H01M 50/555](#), and [H01M 50/557](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/548 . . . . on opposite sides of the cell

- 50/55 . . . . on the same side of the cell

- 50/552 . . . characterised by their shape

**WARNING**

Groups [H01M 50/552](#), [H01M 50/553](#), and [H01M 50/559](#) are incomplete pending reclassification of documents from group [H01M 50/543](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 50/553 . . . . Terminals adapted for prismatic, pouch or rectangular cells

- 50/555 . . . . . Window-shaped terminals

**WARNING**

Group [H01M 50/555](#) is impacted by reclassification into groups [H01M 50/547](#), [H01M 50/548](#), [H01M 50/55](#), [H01M 50/562](#), [H01M 50/564](#), [H01M 50/566](#), and [H01M 50/567](#).

All groups listed in this Warning should be considered in order to perform a complete search.

50/557 . . . . . Plate-shaped terminals

**WARNING**

Group [H01M 50/557](#) is impacted by reclassification into groups [H01M 50/547](#), [H01M 50/548](#), [H01M 50/55](#), [H01M 50/562](#), [H01M 50/564](#), [H01M 50/566](#), and [H01M 50/567](#).

All groups listed in this Warning should be considered in order to perform a complete search.

50/559 . . . . . Terminals adapted for cells having curved cross-section, e.g. round, elliptic or button cells ([H01M 50/553](#) takes precedence)

50/56 . . . . . Cup shaped terminals

50/561 . . . . . {Hollow metallic terminals, e.g. terminal bushings}

50/562 . . . characterised by the material

**WARNING**

Group [H01M 50/562](#) is incomplete pending reclassification of documents from groups [H01M 50/543](#), [H01M 50/555](#), and [H01M 50/557](#).

All groups listed in this Warning should be considered in order to perform a complete search.

50/564 . . . characterised by their manufacturing process

**WARNING**

Groups [H01M 50/564](#) - [H01M 50/567](#) are incomplete pending reclassification of documents from groups [H01M 50/543](#), [H01M 50/555](#), and [H01M 50/557](#).

All groups listed in this Warning should be considered in order to perform a complete search.

50/566 . . . . . by welding, soldering or brazing

50/567 . . . . . by fixing means, e.g. screws, rivets or bolts

50/569 . . . Constructional details of current conducting connections for detecting conditions inside cells or batteries, e.g. of voltage sensing terminals (battery terminal connectors with integrated measuring arrangements [G01R 31/364](#))

**WARNING**

Group [H01M 50/569](#) is incomplete pending reclassification of documents from groups [H01M 6/50](#), [H01M 6/5044](#), [H01M 6/505](#), [H01M 6/5055](#), [H01M 6/5061](#), [H01M 10/48](#), [H01M 10/482](#), [H01M 10/484](#), [H01M 10/486](#), [H01M 10/488](#), [H01M 50/50](#), [H01M 50/502](#), and [H01M 50/543](#).

All groups listed in this Warning should be considered in order to perform a complete search.

50/571 . . . Methods or arrangements for affording protection against corrosion; Selection of materials therefor

50/572 . . . Means for preventing undesired use or discharge

**WARNING**

Group [H01M 50/572](#) is impacted by reclassification into groups [H01M 6/5044](#), [H01M 50/574](#), [H01M 50/583](#), [H01M 50/584](#), [H01M 50/586](#), [H01M 50/588](#), [H01M 50/59](#), [H01M 50/591](#), [H01M 50/593](#), [H01M 50/595](#), and [H01M 50/597](#).

All groups listed in this Warning should be considered in order to perform a complete search.

50/574 . . . Devices or arrangements for the interruption of current

**WARNING**

Groups [H01M 50/574](#) and [H01M 50/583](#) are incomplete pending reclassification of documents from group [H01M 50/572](#).

Groups [H01M 50/572](#), [H01M 50/574](#), and [H01M 50/583](#) should be considered in order to perform a complete search.

50/576 . . . . . in response to theft

50/578 . . . . . in response to pressure

50/579 . . . . . in response to shock

50/581 . . . . . in response to temperature

50/583 . . . . . in response to current, e.g. fuses

50/584 . . . for preventing incorrect connections inside or outside the batteries

**WARNING**

Groups [H01M 50/584](#), [H01M 50/586](#), [H01M 50/588](#), [H01M 50/59](#), [H01M 50/595](#), and [H01M 50/597](#) are incomplete pending reclassification of documents from group [H01M 50/572](#).

All groups listed in this Warning should be considered in order to perform a complete search.

50/586 . . . . . inside the batteries, e.g. of electrodes or electrode connections

50/588 . . . . . outside the batteries, e.g. of terminals or busbars

50/59 . . . . . characterised by the protection means

50/591 . . . . . Covers

**WARNING**

Group [H01M 50/591](#) is incomplete pending reclassification of documents from groups [H01M 50/147](#), [H01M 50/155](#), and [H01M 50/572](#).

All groups listed in this Warning should be considered in order to perform a complete search.

50/593 . . . . . Spacers; Insulating plates

**WARNING**

Group [H01M 50/593](#) is incomplete pending reclassification of documents from groups [H01M 50/147](#), [H01M 50/155](#), and [H01M 50/572](#).

All groups listed in this Warning should be considered in order to perform a complete search.

50/595 . . . . . Tapes

50/597 . . . . . Protection against reversal of polarity

50/598 . . . . . Guarantee labels

50/60 . . . . . Arrangements or processes for filling or topping-up with liquids; Arrangements or processes for draining liquids from casings

**WARNING**

Group [H01M 50/60](#) is impacted by reclassification into groups [H01M 50/609](#), [H01M 50/618](#), [H01M 50/627](#), [H01M 50/673](#), and [H01M 50/682](#).

All groups listed in this Warning should be considered in order to perform a complete search.

50/609 . . . . . Arrangements or processes for filling with liquid, e.g. electrolytes

**WARNING**

Groups [H01M 50/609](#), [H01M 50/618](#), and [H01M 50/627](#) are incomplete pending reclassification of documents from group [H01M 50/60](#).

All groups listed in this Warning should be considered in order to perform a complete search.

50/618 . . . . . Pressure control

50/627 . . . . . Filling ports

50/636 . . . . . Closing or sealing filling ports, e.g. using lids

**WARNING**

Group [H01M 50/636](#) is impacted by reclassification into groups [H01M 50/645](#), [H01M 50/655](#), [H01M 50/664](#), and [H01M 50/668](#).

All groups listed in this Warning should be considered in order to perform a complete search.

50/645 . . . . . Plugs

**WARNING**

Groups [H01M 50/645](#) and [H01M 50/655](#) are incomplete pending reclassification of documents from group [H01M 50/636](#).

Groups [H01M 50/636](#), [H01M 50/645](#), and [H01M 50/655](#) should be considered in order to perform a complete search.

50/655 . . . . . specially adapted for venting

50/664 . . . . . Temporary seals, e.g. for storage of instant batteries or seawater batteries

**WARNING**

Group [H01M 50/664](#) is incomplete pending reclassification of documents from group [H01M 50/636](#).

Groups [H01M 50/636](#) and [H01M 50/664](#) should be considered in order to perform a complete search.

50/668 . . . {Means for preventing spilling of liquid or electrolyte, e.g. when the battery is tilted or turned over}

**WARNING**

Group [H01M 50/668](#) is incomplete pending reclassification of documents from group [H01M 50/636](#).

Groups [H01M 50/636](#) and [H01M 50/668](#) should be considered in order to perform a complete search.

50/673 . . . Containers for storing liquids; Delivery conduits therefor

**WARNING**

Groups [H01M 50/673](#) and [H01M 50/682](#) are incomplete pending reclassification of documents from group [H01M 50/60](#).

Groups [H01M 50/60](#), [H01M 50/673](#), and [H01M 50/682](#) should be considered in order to perform a complete search.

50/682 . . . . . accommodated in battery or cell casings

50/691 . . . . . Arrangements or processes for draining liquids from casings; Cleaning battery or cell casings

50/70 . . . . . Arrangements for stirring or circulating the electrolyte

50/73 . . . . . Electrolyte stirring by the action of gas on or in the electrolyte

50/77 . . . . . with external circulating path

**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

2200/20 . . . Pressure-sensitive devices

2200/30 . . . Preventing polarity reversal

**2220/00 Batteries for particular applications**

2220/10 . . . Batteries in stationary systems, e.g. emergency power source in plant

2220/20 . . . Batteries in motive systems, e.g. vehicle, ship, plane

2220/30 . . . Batteries in portable systems, e.g. mobile phone, laptop

**2250/00 Fuel cells for particular applications; Specific features of fuel cell system**

2250/10 . . . Fuel cells in stationary systems, e.g. emergency power source in plant

2250/20 . . . Fuel cells in motive systems, e.g. vehicle, ship, plane

## H01M

- 2250/30 . Fuel cells in portable systems, e.g. mobile phone, laptop
- 2250/40 . Combination of fuel cells with other energy production systems
- 2250/402 . . Combination of fuel cell with other electric generators ([combination of fuel cells with other electrochemical generator H01M 16/003](#))
- 2250/405 . . Cogeneration of heat or hot water
- 2250/407 . . Combination of fuel cells with mechanical energy generators

### 2300/00 Electrolytes

- 2300/0002 . Aqueous electrolytes
- 2300/0005 . . Acid electrolytes
- 2300/0008 . . . Phosphoric acid-based
- 2300/0011 . . . Sulfuric acid-based
- 2300/0014 . . Alkaline electrolytes
- 2300/0017 . Non-aqueous electrolytes
- 2300/002 . . Inorganic electrolyte
- 2300/0022 . . . Room temperature molten salts
- 2300/0025 . . Organic electrolyte
- 2300/0028 . . . characterised by the solvent
- 2300/0031 . . . . Chlorinated solvents
- 2300/0034 . . . . Fluorinated solvents
- 2300/0037 . . . . Mixture of solvents
- 2300/004 . . . . . Three solvents
- 2300/0042 . . . . . Four or more solvents
- 2300/0045 . . . Room temperature molten salts comprising at least one organic ion
- 2300/0048 . . Molten electrolytes used at high temperature
- 2300/0051 . . . Carbonates
- 2300/0054 . . . Halogenides
- 2300/0057 . . . . Chlorides
- 2300/006 . . . Hydroxides
- 2300/0062 . . . Nitrates
- 2300/0065 . . Solid electrolytes
- 2300/0068 . . . inorganic
- 2300/0071 . . . . Oxides
- 2300/0074 . . . . . Ion conductive at high temperature
- 2300/0077 . . . . . based on zirconium oxide
- 2300/008 . . . . Halides
- 2300/0082 . . . Organic polymers
- 2300/0085 . Immobilising or gelification of electrolyte
- 2300/0088 . Composites
- 2300/0091 . . in the form of mixtures
- 2300/0094 . . in the form of layered products, e.g. coatings
- 2300/0097 . . . with adhesive layers