CPC COOPERATIVE PATENT CLASSIFICATION

H ELECTRICITY

(NOTE omitted)

H01 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.

4/00 Electrodes

NOTE

In classifying electrodes of hybrid cells, the individual half-cells of the hybrid cell are considered separately, e.g. an electrode in the primary half of a primary/fuel type hybrid cell is considered to be a primary-cell electrode covered by H01M 4/06.

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

4/10 . . . . of pressed electrodes with central core, i.e. dollies

4/12 . . . . of consumable metal or alloy electrodes (use of alloy compositions as active materials H01M 4/38)

4/13 . . Electrodes for accumulators with non-aqueous electrolyte, e.g. for lithium-accumulators; Processes of manufacture thereof

NOTE

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

4/131 . . . Electrodes based on mixed oxides or hydroxides, or on mixtures of oxides or hydroxides, e.g. LiCoOx

4/1315 . . . . containing halogen atoms, e.g. LiCoOxFy

4/133 . . . Electrodes based on 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

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 $LaNi_5$}

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. $LiTi_2O_4$ or $LiTi_2OxFy$ (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. $LiMn_2O_4$ or $LiMn_2OxFy$

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. $LiNiO_2$, $LiCoO_2$ 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 $LiCoF_y$; 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 salts 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
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
6/145 . . {containing ammonia}
6/16 . . with organic electrolyte (H01M 6/18 takes 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. for maintaining operating temperature (constructional details of current conducting connections for detecting conditions inside cells or batteries, e.g. details of voltage sensing terminals, H01M 50/569)
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}
6/505 . . . {Cells combined with indicating means for external visualization of the condition, e.g. by change of colour or of light intensity}
6/5055 . . . {End of discharge indicated by a voltage step}
6/5061 . . . {Cells combined with sound indicating means}
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

In this group, the following expression is used with the meaning indicated:
- "Fuel cell" means an electrochemical generator 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
8/026 . . . . characterised by grooves, e.g. their pitch or depth
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
8/0269 . . . {Separators, collectors or interconnectors including a printed circuit board}
8/0271 . . Sealing or supporting means around electrodes, matrices or membranes
8/0273 . . . with sealing or supporting means in the form of a frame
8/0276 . . . Sealing means characterised by their form (H01M 8/0273 takes precedence)
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)
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}
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
8/04225 . . . during start-up
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
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 dehydriding 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]}
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_2 or ZrO_2
8/1053 . . . . . consisting of layers of polymers with at least one layer being ionically conductive
8/1055 . . . . . {Inorganic layers on the polymer electrolytes, e.g. inorganic coatings}
8/1058 . . . . characterised by a porous support having no ion-conducting properties
8/106 . . . . . characterised by the chemical composition of the porous support
8/1062 . . . . . characterised by the physical properties of the porous support, e.g. its porosity or thickness
8/1065 . . . . characterised by the form, e.g. perforated or wave-shaped
8/1067 . . . . characterised by their physical properties, e.g. porosity, ionic conductivity or thickness
8/1069 . . . . characterised by the manufacturing processes
8/1072 . . . . . by chemical reactions, e.g. in situ polymerisation or in situ crosslinking
8/1074 . . . . . {Sol-gel processes}
8/1076 . . . . . {Micromachining techniques, e.g. masking, etching steps or photolithography}
8/1079 . . . . . {Inducing porosity into non porous precursors membranes, e.g. leaching, pore stretching}
8/1081 . . . . . starting from solutions, dispersions or slurries exclusively of polymers
8/1083 . . . . . {Starting from polymer melts other than monomer melts}
8/1086 . . . . . After-treatment of the membrane other than by polymerisation
8/1088 . . . . . Chemical modification, e.g. sulfonation
8/109 . . . . . {thermal other than drying, e.g. sintering}
8/1093 . . . . . {mechanical, e.g. pressing, puncturing}
2008/1095 . . {Fuel cells with polymeric electrolytes}
8/1097 . . Fuel cells applied on a support, e.g. miniature fuel cells deposited on silica supports
8/12 . . operating at high temperature, e.g. with stabilised ZrO_2 electrolyte
8/1213 . . . characterised by the electrode/electrolyte combination or the supporting material
8/122 . . . . Corrugated, curved or wave-shaped MEA
8/1226 . . . . characterised by the supporting layer
8/1231 . . . with both reactants being gaseous or 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}
2008/128 . . . {Fuel cells with solid halide electrolytes}
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}
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
8/2404 . . Processes or apparatus for grouping fuel cells
8/241 . . with solid or matrix-supported electrolytes
8/2418 . . . Grouping by arranging unit cells in a plane (H01M 8/2425, H01M 8/244 take precedence)
8/242 . . . comprising framed electrodes or intermediary frame-like gaskets (H01M 8/2425, H01M 8/244 take precedence)
8/2425 . . . High-temperature cells with solid electrolytes
8/2428 . . . . Grouping by arranging unit cells on a surface of any form, e.g. planar or tubular
8/243 . . . . Grouping of unit cells of tubular or cylindrical configuration
8/2432 . . . . Grouping of unit cells of planar configuration

8/2435 . . . . with monolithic core structure, e.g. honeycombs
8/244 . . . with matrix-supported molten electrolyte
8/2455 . . with liquid, solid or electrolyte-charged reactants
8/2457 . . with both reactants being gaseous or vaporised
8/2459 . . {Comprising electrode layers with interposed electrolyte compartment with possible electrolyte supply or circulation}
8/2465 . . Details of groupings of fuel cells
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
8/2484 . . . characterised by external manifolds
8/2485 . . . . Arrangements for sealing external manifolds; Arrangements for mounting external manifolds around a stack
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

In this group, 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)
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
10/0561 . . . the electrolyte being constituted of inorganic materials only
10/0562 . . . . Solid materials
10/0563 . . . . Liquid materials, e.g. for Li-$SOCl_2$ cells
10/0564 . . . the electrolyte being constituted of organic materials only
10/0565 . . . . Polymeric materials, e.g. gel-type or solid-type
10/0566 . . . . Liquid materials
10/0567 . . . . . characterised by the additives
10/0568 . . . . . characterised by the solutes
10/0569 . . . . . characterised by the solvents
10/058 . . Construction or manufacture
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 the condition of cells, e.g. the level or density of the electrolyte (constructional details of current conducting connections for detecting conditions inside cells or batteries, e.g. details of voltage sensing terminals, H01M 50/569)
10/482 . . . {for several batteries or cells simultaneously or sequentially}
10/484 . . . {for measuring electrolyte level, electrolyte density or electrolyte conductivity}
10/486 . . . {for measuring temperature}
10/488 . . . {Cells or batteries combined with indicating means for external visualization of the condition, e.g. by change of colour or of light density}
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 (charging or discharging in response to temperature H01M 10/44 {, H01M 10/443}; measurement of temperature H01M 10/48 {, H01M 10/486})
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.

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 H10F 10/00;
- 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 H10K 30/00;
- 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 H10F)}

16/00 Structural combinations of different types of electrochemical generators

16/003 . {of fuel cells with other electrochemical devices, e.g. capacitors, electrolysers}

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

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

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 chip structure, e.g. micro-sized batteries integrated on chips

50/112 . . . Monobloc comprising multiple compartments

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

50/116 . . characterised by the material

50/117 . . . Inorganic material

50/119 . . . . Metals

50/121 . . . Organic material

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

50/124 . . . having a layered structure

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, size or heat resistance

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

50/141 . . . for protecting against humidity

50/143 . . . Fireproof; Explosion-proof

50/145 . . . for protecting against corrosion

50/147 . . Lids or covers

50/148 . . . characterised by their shape

50/15 . . . . for prismatic or rectangular cells (H01M 50/153 takes precedence)

50/152 . . . . for cells having curved cross-section, e.g. round or elliptic (H01M 50/15, H01M 50/153 take precedence)

50/153 . . . . for button or coin cells

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

50/157 . . . . Inorganic material

50/159 . . . . . Metals

50/16 . . . . Organic material

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

50/164 . . . . having a layered structure

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

50/167 . . . . by crimping

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

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

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

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

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

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

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

50/188 . . . . the sealing members being arranged between the lid and terminal

50/19 . . . characterised by the material

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)

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

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

50/207 . . . characterised by their shape

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

50/211 . . . . adapted for pouch cells

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

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

50/218 . . characterised by the material

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
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
50/247 . . specially adapted for portable devices, e.g. mobile phones, computers, hand tools or pacemakers
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)
50/251 . . specially adapted for stationary devices, e.g. power plant buffering or backup power supplies
50/253 . . adapted for specific cells, e.g. electrochemical cells operating at high temperature
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
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
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)
50/271 . . Lids or covers for the racks or secondary casings
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]
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)
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)
50/298 . . characterised by the wiring of battery packs
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
50/358 . . . External gas exhaust passages located on the battery cover or case
50/367 . . . Internal gas exhaust passages forming part of the battery cover or case; Double cover vent systems
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
50/403 . . Manufacturing processes of separators, membranes or diaphragms
50/406 . . . Moulding; Embossing; Cutting
50/409 . . Separators, membranes or diaphragms characterised by the material
50/411 . . . Organic material
50/414 . . . . Synthetic resins, e.g. thermoplastics or thermosetting resins
50/417 . . . . . Polyolefins
50/42 . . . . . Acrylic resins
50/423 . . . . . Polyamide resins
50/426 . . . . . Fluorocarbon polymers
50/429 . . . . Natural polymers
50/4295 . . . . . {Natural cotton, cellulose or wood}
50/431 . . . Inorganic material
50/434 . . . . Ceramics
50/437 . . . . . Glass
50/44 . . . Fibrous material
50/443 . . . Particulate material
50/446 . . . Composite material consisting of a mixture of organic and inorganic materials
50/449 . . . having a layered structure
50/451 . . . . comprising layers of only organic material and layers containing inorganic material
50/454 . . . . comprising a non-fibrous layer and a fibrous layer superimposed on one another
50/457 . . . . comprising three or more layers
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
50/466 . . . U-shaped, bag-shaped or folded
50/469 . . . tubular or cylindrical

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
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
50/491 . . . Porosity
50/494 . . . Tensile strength
50/497 . . . Ionic conductivity
50/50 . Current conducting connections for cells or batteries
50/502 . . Interconnectors for connecting terminals of adjacent batteries; Interconnectors for connecting cells outside a battery casing
50/503 . . . characterised by the shape of the interconnectors
50/505 . . . comprising a single busbar
50/507 . . . comprising an arrangement of two or more busbars within a container structure, e.g. busbar modules
50/509 . . . characterised by the type of connection, e.g. mixed connections
50/51 . . . . Connection only in series
50/512 . . . . Connection only in parallel
50/514 . . . Methods for interconnecting adjacent batteries or cells
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]
50/521 . . . characterised by the material
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
50/533 . . . characterised by the shape of the leads or tabs
50/534 . . . characterised by the material of the leads or tabs
50/536 . . . characterised by the method of fixing the leads to the electrodes, e.g. by welding
50/538 . . . Connection of several leads or tabs of wound or folded electrode stacks
50/54 . . . Connection of several leads or tabs of plate-like electrode stacks, e.g. electrode pole straps or bridges
50/541 . . . . for lead-acid accumulators
50/543 . . Terminals
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
50/548 . . . . on opposite sides of the cell
50/55 . . . . on the same side of the cell
50/552 . . . characterised by their shape
50/553 . . . . Terminals adapted for prismatic, pouch or rectangular cells
50/555 . . . . . Window-shaped terminals
50/557 . . . . . Plate-shaped terminals
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
50/564 . . . characterised by their manufacturing process
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. details of voltage sensing terminals (battery terminal connectors with integrated measuring arrangements G01R 31/364)
50/571 . . Methods or arrangements for affording protection against corrosion; Selection of materials therefor
50/572 . . Means for preventing undesired use or discharge
50/574 . . . Devices or arrangements for the interruption of current
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
50/586 . . . . inside the batteries, e.g. incorrect connections of electrodes
50/588 . . . . outside the batteries, e.g. incorrect connections of terminals or busbars
50/59 . . . . characterised by the protection means
50/591 . . . . . Covers
50/593 . . . . . Spacers; Insulating plates
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
50/609 . . Arrangements or processes for filling with liquid, e.g. electrolytes
50/618 . . . Pressure control
50/627 . . . Filling ports
50/636 . . . . Closing or sealing filling ports, e.g. using lids
50/645 . . . . . Plugs
50/655 . . . . . specially adapted for venting
50/664 . . . . . Temporary seals, e.g. for storage of instant batteries or seawater batteries
50/668 . . {Means for preventing spilling of liquid or electrolyte, e.g. when the battery is tilted or turned over}
50/673 . . Containers for storing liquids; Delivery conduits therefor
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
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
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