

CPC COOPERATIVE PATENT CLASSIFICATION

H ELECTRICITY

(NOTE omitted)

H01 BASIC ELECTRIC ELEMENTS

(NOTE omitted)

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

NOTE

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

WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

2/00	Constructional details or processes of manufacture of the non-active parts	2/0252	. . . {High- temperature cells or batteries, e.g. Na-S cells, Li-Cl ₂ cells}
2/02	. Cases, jackets or wrappings	2/0255	. . . {Hybrid cells or batteries (H01M 2/0222 takes precedence)}
2/0202	. . {for small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment (H01M 2/025 takes precedence)}	2/0257	. . {characterised by the material}
2002/0205	. . . {Cases with a shape not covered by groups H01M 2/0207 - H01M 2/0235 }	2/026	. . . {for small-sized cells or batteries, batteries or cells for portable equipment}
2/0207	. . . {Flat-shaped cells or batteries of flat cells (H01M 2/0222 takes precedence)}	2/0262	. . . {for large-sized cells or batteries, batteries or cells for traction or motive power or standby power}
2/021	. . . . {with both terminals passing through the case or cover}	2/0265	. . . {for high-temperature cells}
2/0212	. . . . {with plate-like or sheet-like terminals (H01M 2/0215 takes precedence)}	2/0267	. . . {of wrappings, outside coatings, jackets around completely closed cell elements}
2/0215	. . . . {with window-shaped terminals}	2/027	. . . {Casing material forming terminal of the cell}
2/0217	. . . {Cases of prismatic shape}	2/0272	. . . . {characterized by the internal coating or internal conductive layer}
2/022	. . . {Cases of cylindrical or round shape}	2/0275	. . . {of flexible envelopes or bags around open cell elements}
2/0222	. . . . {Button or coin cell cases}	2/0277	. . . {Insulating material (H01M 2/029 takes precedence)}
2/0225	. . . . {with cup-shaped terminals}	2/028	. . . . {being one layer}
2/0227	. . . . . {with both cup-shaped terminals}	2/0282	. . . . . {having particulate or reinforced material}
2/023	. . . . . {with one cup-shaped terminal}	2/0285	. . . {Conductive material}
2/0232	. . . . . {with a passing-through terminal (H01M 2/0235 takes precedence)}	2/0287	. . . {comprising layers}
2/0235	. . . . . {with a collector centrally disposed in the active mass, e.g. Leclanch cells}	2/029	. . . . {consisting only of insulating material}
2/0237	. . {for large-sized cells or batteries, e.g. starting, lighting or ignition [SLI] batteries, traction or motive power type or standby power batteries (H01M 2/025 takes precedence)}	2/0292	. . . . {characterised by the external coating on the casing}
2/024	. . . {Details}	2/0295	. . . {Composite material consisting of mixed or dispersed phases}
2/0242	. . . {Monobloc manufactured cases comprising multiple compartments}	2002/0297	. . . {characterised by physical parameters}
2/0245	. . . {Assembly of different cases, i.e. modular battery or cases particularly provided with means for assembling}	2/04	. . Lids or covers
2/0247	. . . . {sealed to each other in a non-detachable manner}	2/0404	. . . {for small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment (H01M 2/0443 takes precedence)}
2/025	. . {for cells or batteries working under specific conditions such as high temperature, gas diffusion, external electrolyte circulation, external supply of reactants}	2/0408	. . . . {Crimp-sealed cells or batteries; Cells or batteries with turned-over edges}
		2/0413	. . . . . {provided with an intermediary sealing member between the crimped or curled edges (H01M 2/0417 takes precedence)}

- 2/0417 {comprising an insulating cover provided with an axial bore for receiving a central current collector}
- 2/0421 {with an external conductive cover}
- 2/0426 {with a metallic cover of which the borders are soldered or welded with the case}
- 2/043 . . . {for large-sized cells or batteries, e.g. LIS batteries, traction or motive power type or standby power batteries ([H01M 2/0443 takes precedence](#))}
- 2/0434 {Methods for assembling case and cover}
- 2/0439 {without provisions for disassembling}
- 2/0443 . . . {for cells or batteries working under specific conditions such as high temperature, gas diffusion, external electrolyte circulation, external supply of reactants}
- 2/0447 {High-temperature cells or batteries}
- 2/0452 {Hybrid cells or batteries}
- 2/0456 . . . {characterised by the shape}
- 2/046 {Disk-like lids for cylindrical batteries}
- 2/0465 {Button cell lids}
- 2/0469 {Lids for flat or sheet-like batteries}
- 2/0473 {Lids for prismatic cells}
- 2/0478 . . . {characterised by the material}
- 2/0482 {Insulating materials}
- 2/0486 {Conducting materials}
- 2/0491 {characterised by the coating}
- 2/0495 {Conductive coating material}
- 2/06 . . Arrangements for introducing electric connectors into or through cases
- 2/065 . . . {using glass or ceramic sealing material}
- 2/08 . . Sealing materials
- 2/10 . . Mountings; Suspension devices; Shock absorbers; Transport or carrying devices; Holders ([structural combination of accumulators with charging apparatus H01M 10/46](#))
- 2/1005 . . {Carrying devices}
- 2/1011 . . . {using the terminals or connecting links}
- 2/1016 . . {Cabinets, cases, fixing devices, adapters, racks or battery packs}
- 2/1022 . . . {for miniature batteries or batteries for portable equipment ([batteries in portable systems H01M 2220/30](#))}
- 2/1027 {with the possibility of incorporating batteries of different sizes}
- 2/1033 {providing adapters around the batteries}
- 2/1038 {for button cells}
- 2/1044 {forming a whole with or incorporated in or fixed to the electronic appliance}
- 2/105 {for cells of cylindrical configuration}
- 2/1055 {forming a whole with or incorporated in or fixed to the electronic appliance}
- 2/1061 {for cells of prismatic configuration or for sheet-like batteries}
- 2/1066 {forming a whole with or incorporated in or fixed to the electronic appliance}
- 2/1072 . . . {for starting, lighting or ignition batteries; Vehicle traction batteries; Stationary or load leading batteries ([batteries in stationary systems H01M 2220/10](#), [batteries in motive systems H01M 2220/20](#))}
- 2/1077 {Racks, groups of several batteries ([H01M 2/1088 takes precedence](#))}
- 2/1083 {Fixing on vehicles}
- 2/1088 {for accumulators working at high temperature}
- 2/1094 . . {Particular characteristics of materials used to isolate the battery from its environment, e.g. thermal insulation, corrosion resistance, pressure resistance, electrolyte leakage}
- 2/12 . . Vent plugs or other mechanical arrangements for facilitating escape of gases
- 2/1205 . . {Vent arrangements incorporated in vent plugs or multiplug systems detachable from the battery or cell}
- 2/1211 . . . {Multiplug systems or arrangements; Plurality of plugs surrounded by a common cover}
- 2/1217 {in the shape of a one-piece member}
- 2/1223 . . {Vent arrangements of resealable design ([H01M 2/1205](#), [H01M 2/1247-H01M 2/1294 take precedence](#))}
- 2/1229 . . . {comprising a deformable, elastic or flexible valve member}
- 2/1235 . . {Emergency or safety arrangements of non-resealable design ([H01M 2/1205](#), [H01M 2/1247-H01M 2/1294 take precedence](#))}
- 2/1241 . . . {in the form of rupturable membranes or weakened parts, e.g. pierced with the aid of a sharp member}
- 2/1247 . . {Explosion- or splash-preventing means contained in the head space of the battery, e.g. means floating on the electrolyte}
- 2/1252 . . {comprising elongated, tortuous or labyrinth-shaped exhaust passages in the battery cover or case; Double cover vent systems}
- 2/1258 . . {containing electrolyte neutralising or absorbing means}
- 2/1264 . . {comprising gas-pervious parts or elements}
- 2/127 . . . {as flame arrester or ignition preventing means}
- 2/1276 . . {Spring-loaded vent valves}
- 2/1282 . . {Thermally responsive or sensitive vent means}
- 2/1288 . . {Film- or sheet-like elastic valve members optionally coated with non-drying glue}
- 2/1294 . . {Slit, perforated or punctured elastic valve members}
- 2/14 . . Separators; Membranes; Diaphragms; Spacing elements
- 2/145 . . {Manufacturing processes}
- 2/16 . . characterised by the material
- 2/1606 . . . {comprising fibrous material}
- 2/1613 {Inorganic fibrous material}
- 2/162 {Organic fibrous material}
- 2/1626 {Natural fibres, e.g. cotton, cellulose}
- 2/1633 {Mixtures of inorganic and organic fibres}
- 2/164 . . . {comprising non-fibrous material ([H01M 2/1606 takes precedence](#))}
- 2/1646 {Inorganic non-fibrous material}
- 2/1653 {Organic non-fibrous material}
- 2/166 {Mixtures of inorganic and organic non-fibrous material}
- 2/1666 . . . {comprising a non-fibrous layer and a fibrous layer superimposed on one another}
- 2/1673 . . . {Electrode-separator combination}
- 2/168 {with adhesive layers between electrodes and separators}

- 2/1686 . . . {Separators having two or more layers of either fibrous or non-fibrous materials}
- 2/1693 . . . {Wood}
- 2/18 . . characterised by the shape
- 2/185 . . . {Separators made of one single microscopic fiber}
- 2/20 . Current conducting connections for cells
- 2/202 . . {Interconnectors for or interconnection of the terminals of adjacent or distinct batteries or cells}
- 2/204 . . . {of small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment}
- 2/206 . . . {of large-sized cells or batteries, e.g. starting, lighting or ignition [SLI] batteries, traction or motive power type or standby power batteries}
- 2/208 . . . {for cells or batteries working under specific conditions such as high temperature, gas diffusion, external electrolyte circulation, external supply of reactants}
- 2/22 . . Fixed connections, i.e. not intended for disconnection
- 2/24 . . . Intercell connections through partitions, e.g. in a battery case
- 2/26 . . . Electrode connections
- 2/263 {Electrode connections overlying wound or folded electrode stacks}
- 2/266 {Interconnections of several platelike electrodes in parallel, e.g. electrode pole straps or bridges}
- 2/28 for lead-acid accumulators
- 2/30 . . Terminals
- 2/302 . . . {Terminal post members on carbon electrodes; Machines or processes for applying said terminal post members, e.g. capping of carbon rods}
- 2/305 . . . {Poles or terminals for starting, lighting or ignition [SLI] batteries, traction or motive power type or standby power batteries}
- 2/307 {the poles being connected and passing through hollow metallic terminals, e.g. terminal bushings}
- 2/32 . . Methods or arrangements for affording protection against corrosion; Selection of materials therefor
- 2/34 . . with provision for preventing undesired use or discharge {, e.g. complete cut of current ([safety devices H01M 2200/00](#))}
- 2/341 . . . {Anti-theft provisions}
- 2/342 . . . {Protection against polarity reversal}
- 2/344 . . . {Guarantee labels or covers}
- 2/345 . . . {in response to pressure}
- 2/347 . . . {in response to shock}
- 2/348 . . . {in response to temperature}
- 2/36 . . Arrangements for filling, topping-up or emptying cases with or of liquid, e.g. for filling with electrolytes, for washing-out
- 2/361 . . {Filling of small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment}
- 2/362 . . {Filling or topping up of large-sized cells or batteries, e.g. starting, lighting or ignition [SLI] batteries, traction or motive power type or standby power batteries}
- 2/364 . . {Removing or drainage of electrolyte; Cleaning battery or cell cases}
- 2/365 . . {means or methods for closing or sealing the liquid supply hole}
- 2/367 . . {with means for preventing spilling of liquid or electrolyte, e.g. when the battery is tilted or turned over}
- 2/368 . . . {by closing the vent passages with a valve}
- 2/38 . . Arrangements for moving electrolytes
- 2/385 . . {Electrolyte stirring by action of gases on or in the electrolyte}
- 2/40 . . with external circulating path ([H01M 8/04 takes precedence](#))
- 4/00 Electrodes**
- 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 ([electrode materials of hybrid or double layer capacitors H01G 11/30-H01G 11/50](#))
- 4/362 . . . {Composites}
- 4/364 {as mixtures}
- 4/366 {as layered products}
- 4/368 . . . {Liquid depolarisers}
- 4/38 . . . of elements or alloys
- 4/381 {Alkaline or alkaline earth metals elements ([H01M 4/40 takes precedence](#))}
- 4/382 {Lithium ([H01M 4/405 takes precedence](#))}
- 4/383 {Hydrogen absorbing alloys}
- 4/385 {of the type LaNi₅}
- 4/386 {Silicon or alloys based on silicon}
- 4/387 {Tin or alloys based on tin}
- 4/388 {Halogens}
- 4/40 Alloys based on alkali metals
- 4/405 {Alloys based on lithium}
- 4/42 Alloys based on zinc
- 4/44 Alloys based on cadmium
- 4/46 Alloys based on magnesium or aluminium
- 4/463 {Aluminium based}
- 4/466 {Magnesium based}
- 4/48 . . . of inorganic oxides or hydroxides
- 4/481 {of mercury}
- 4/483 {for non-aqueous cells ([H01M 4/485 takes precedence](#))}
- 4/485 of mixed oxides or hydroxides for inserting or intercalating light metals, e.g. LiTi₂O₄ or LiTi₂OxFy ([H01M 4/505](#), [H01M 4/525 take precedence](#))
- 4/50 of manganese
- 4/502 {for non-aqueous cells ([H01M 4/505 takes precedence](#))}
- 4/505 of mixed oxides or hydroxides containing manganese for inserting or intercalating light metals, e.g. LiMn₂O₄ or LiMn₂OxFy
- 4/52 of nickel, cobalt or iron
- 4/521 {of iron for aqueous cells}
- 4/523 {for non-aqueous cells ([H01M 4/525 takes precedence](#))}

- 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 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 CF_x
- 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, calendaring ([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 M_1MeO_3 , M_1 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 non-active parts [H01M 2/00](#); of electrodes [H01M 4/00](#))
- 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 (organic electrolyte solvents [H01M 2300/0028](#))}
- 6/166 {by the solute}
- 6/168 {by additives}
- 6/18 . . with solid electrolyte
- 6/181 . . . {with polymeric electrolytes (organic polymers electrolytes [H01M 2300/0082](#))}
- 6/182 . . . {with halogenide as solid electrolyte (halide solid electrolytes [H01M 2300/008](#))}
- 6/183 {with fluoride as solid electrolyte}
- 6/185 . . . {with oxides, hydroxides or oxysalts as solid electrolytes (oxides solid electrolyte [H01M 2300/0071](#))}
- 6/186 {Only oxysalts-containing solid electrolytes}

6/187	. . . {Solid electrolyte characterised by the form (layered solid electrolytes H01M 2300/0094)}	8/002	. {Shape, form of a fuel cell}
6/188	. . . {Processes of manufacture}	8/004	. . {Cylindrical, tubular or wound}
6/20	. . . working at high temperature (deferred-action thermal cells H01M 6/36)	8/006	. . {Flat}
6/22	. Immobilising of electrolyte	8/008	. Disposal or recycling of fuel cells
6/24	. Cells comprising two different electrolytes	8/02	. Details (electrodes H01M 4/86 - H01M 4/98)
6/26	. Cells without oxidising active material, e.g. Volta cells	8/0202	. . Collectors; Separators, e.g. bipolar separators; Interconnectors
6/28	. Standard cells, e.g. Weston cells	8/0204	. . . Non-porous and characterised by the material
6/30	. Deferred-action cells	8/0206	. . . . Metals or alloys
6/32	. . activated through external addition of electrolyte or of electrolyte components	8/0208	. . . . . Alloys
6/34	. . . Immersion cells, e.g. sea-water cells	8/021	. . . . . Alloys based on iron
6/36	. . containing electrolyte and made operational by physical means, e.g. thermal cells	8/0213	. . . . Gas-impermeable carbon-containing materials
6/38	. . . by mechanical means	8/0215	. . . . Glass; Ceramic materials
6/385	. . . . {by insertion of electrodes}	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
6/40	. Printed batteries {, e.g. thin film batteries}	8/0219	. . . . . {Chromium complex oxides}
6/42	. Grouping of primary cells into batteries (H01M 6/40 takes precedence)	8/0221	. . . . Organic resins; Organic polymers
6/425	. . {Multimode batteries, batteries with "reserve cells"}	8/0223	. . . . Composites
6/44	. . of tubular or cup-shaped cells	8/0226	. . . . . in the form of mixtures
6/46	. . of flat cells	8/0228	. . . . . in the form of layered or coated products
6/48	. . . with bipolar electrodes	8/023	. . . Porous and characterised by the material
6/485	. . . . {Side-by-side bipolar batteries}	8/0232	. . . . Metals or alloys
6/50	. Methods or arrangements for servicing or maintenance, e.g. maintaining operating temperature {(cells or batteries combined with safety devices H01M 2200/00)}	8/0234	. . . . Carbonaceous material
6/5005	. . {Auxiliary electrodes}	8/0236	. . . . Glass; Ceramics; Cermets
6/5011	. . {for several cells simultaneously or successively}	8/0239	. . . . Organic resins; Organic polymers
6/5016	. . . {Multimode utilisation}	8/0241	. . . . Composites
6/5022	. . {Arrangements for moving electrodes or separating elements}	8/0243	. . . . . in the form of mixtures
6/5027	. . {Dummy cells}	8/0245	. . . . . in the form of layered or coated products
6/5033	. . {used as charging means for another battery}	8/0247	. . . characterised by the form (characterised by a channel configuration H01M 8/0258)
6/5038	. . {Heating or cooling of cells or batteries}	8/025	. . . . semicylindrical
6/5044	. . {Cells or batteries structurally combined with cell condition indicating means (H01M 2/34 takes precedence)}	8/0252	. . . . tubular
6/505	. . . {Cells combined with indicating means for externally visualisation of the condition, e.g. by change of colour or of light intensity}	8/0254	. . . . corrugated or undulated
6/5055	. . . {End of discharge indicated by a voltage step}	8/0256	. . . . Vias, i.e. connectors passing through the separator material
6/5061	. . . {cells combined with sound indicating means}	8/0258	. . . characterised by the configuration of channels, e.g. by the flow field of the reactant or coolant
6/5066	. . {Type recognition}		WARNING
6/5072	. . {Preserving or storing cells}		Group H01M 8/0258 is incomplete pending reclassification of documents from group H01M 8/0267 and impacted by reclassification into H01M 8/2483 .
6/5077	. . {Regeneration of reactants or electrolyte}		Groups H01M 8/0258 , H01M 8/0267 and H01M 8/2483 should be considered in order to perform a complete search.
6/5083	. . {Testing apparatus}	8/026	. . . . characterised by grooves, e.g. their pitch or depth
6/5088	. . {Initial activation; predischARGE; Stabilisation of initial voltage}		WARNING
2006/5094	. . {Aspects relating to capacity ratio of electrolyte/ electrodes or anode/cathode}		Groups H01M 8/026-H01M 8/0265 are incomplete pending reclassification of documents from group H01M 8/0267 .
6/52	. Reclaiming serviceable parts of waste cells or batteries {, e.g. recycling}		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.
8/00	Fuel cells; Manufacture thereof	8/0263	. . . . having meandering or serpentine paths
	NOTE		
	Fuel cells are electrochemical generators wherein the reactants are supplied from outside		

- 8/0265 . . . the reactant or coolant channels having varying cross sections
- 8/0267 . . . having heating or cooling means, e.g. heaters or coolant flow channels

WARNING

Group [H01M 8/0267](#) is impacted by reclassification into groups [H01M 8/0258](#) - [H01M 8/0265](#) and [H01M 8/2483](#).

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

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

WARNING

Group [H01M 8/0271](#) is incomplete pending reclassification of documents from group [H01M 8/0297](#).

Group [H01M 8/0297](#) and [H01M 8/0271](#) should be considered in order to perform a complete search.

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

WARNING

Group [H01M 8/0273](#) is incomplete pending reclassification of documents from group [H01M 8/0276](#).

Group [H01M 8/0276](#) and [H01M 8/0273](#) should be considered in order to perform a complete search.

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

WARNING

Group [H01M 8/0276](#) is impacted by reclassification into group [H01M 8/0273](#).

Groups [H01M 8/0276](#) and [H01M 8/0273](#) should be considered in order to perform a complete search.

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

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

WARNING

Group [H01M 8/0297](#) is impacted by reclassification into groups [H01M 8/0271](#).

Groups [H01M 8/0297](#) and [H01M 8/0271](#) should be considered in order to perform a complete search.

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

NOTE

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

- 8/04007 . . . related to heat exchange
- 8/04014 . . . Heat exchange using gaseous fluids; Heat exchange by combustion of reactants
- 8/04022 {Heating by combustion}
- 8/04029 . . . Heat exchange using liquids
- 8/04037 . . . {Electrical heating}
- 8/04044 . . . Purification of heat exchange media
- 8/04052 . . . {Storage of heat in the fuel cell system}
- 8/04059 . . . {Evaporative processes for the cooling of a fuel cell}
- 8/04067 . . . {Heat exchange or temperature measuring elements, thermal insulation, e.g. heat pipes, heat pumps, fins}
- 8/04074 {Heat exchange unit structures specially adapted for fuel cell (heat exchanger for fuel cells [F28D 2021/0043](#))}
- 8/04082 . . Arrangements for control of reactant parameters, e.g. pressure or concentration
- 8/04089 . . . of gaseous reactants
- 8/04097 {with recycling of the reactants ([H01M 8/04119](#), [H01M 8/04104](#) take precedence)}
- 8/04104 {Regulation of differential pressures}
- 8/04111 using a compressor turbine assembly
- 8/04119 with simultaneous supply or evacuation of electrolyte; Humidifying or dehumidifying
- 8/04126 {Humidifying}
- 8/04134 {by coolants}
- 8/04141 {by water containing exhaust gases}
- 8/04149 {by diffusion, e.g. making use of membranes}
- 8/04156 {with product water removal}
- 8/04164 {by condensers, gas-liquid separators or filters}
- 8/04171 {using adsorbents, wicks or hydrophilic material}
- 8/04179 {by purging or increasing flow or pressure of reactants}
- 8/04186 . . . of liquid-charged or electrolyte-charged reactants
- 8/04194 {Concentration measuring cells}
- 8/04197 . . . {Preventing means for fuel crossover}
- 8/04201 . . . {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, SiO₂ or ZrO₂
- 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 ZrO₂ 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}
(Frozen)

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 reactants with framed electrodes or intermediary frame-like gaskets}
(Frozen)

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

WARNING

Group [H01M 10/04](#) is impacted by reclassification into group [H01M 10/058](#).

Groups [H01M 10/04](#) and [H01M 10/058](#) should be considered in order to perform a complete search.

- 10/0404 . . {Machines for assembling batteries}
- 10/0409 . . . {for cells with wound electrodes}
- 10/0413 . . {Large-sized flat cells or batteries for motive or stationary systems with plate-like electrodes}
- 10/0418 . . . {with bipolar electrodes}
- 10/0422 . . {Cells or battery with cylindrical casing}

- 10/0427 . . . {Button cells}
- 10/0431 . . {Cells with wound or folded electrodes ([H01M 10/045](#) takes precedence)}
- 10/0436 . . {Small-sized flat cells or batteries for portable equipment}
- 10/044 . . . {with bipolar electrodes}
- 10/0445 . . {Multimode batteries, e.g. containing auxiliary cells or electrodes switchable in parallel or series connections}
- 10/045 . . {Cells or batteries with folded plate-like electrodes}
- 10/0454 . . . {Cells or batteries with electrodes of only one polarity folded}
- 10/0459 . . {Cells or batteries with folded separator between plate-like electrodes}
- 10/0463 . . {Cells or batteries with horizontal or inclined electrodes}
- 10/0468 . . {Compression means for stacks of electrodes and separators}
- 10/0472 . . {Vertically superposed cells with vertically disposed plates}
- 10/0477 . . {with circular plates}
- 10/0481 . . {Compression means other than compression means for stacks of electrodes and separators}
- 10/0486 . . {Frames for plates or membranes}
- 10/049 . . {Processes for forming or storing electrodes in the battery container}
- 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-SOCl₂ 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

- 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 externally visualisation of the condition, e.g. by change of colour or of light intensity}
 - 10/52 . . Removing gases inside the secondary cell, e.g. by absorption ([vent plugs or other mechanical arrangements for facilitating escape of gases H01M 2/12](#))
 - 10/523 . . . {by recombination on a catalytic material}
 - 10/526 . . . {by gas recombination on the electrode surface or by structuring the electrode surface to improve gas recombination}
 - 10/54 . Reclaiming serviceable parts of waste accumulators
 - 10/60 . Heating or cooling; Temperature control
 - 10/61 . . Types of temperature control
 - 10/613 . . . Cooling or keeping cold
 - 10/615 . . . Heating or keeping warm
 - 10/617 . . . for achieving uniformity or desired distribution of temperature
 - 10/62 . . specially adapted for specific applications
 - 10/623 . . . Portable devices, e.g. mobile telephones, cameras or pacemakers
 - 10/6235 Power tools
 - 10/625 . . . Vehicles
 - 10/627 . . . Stationary installations, e.g. power plant buffering or backup power supplies
 - 10/63 . . Control systems ([measurement of temperature H01M 10/486; charging or discharging in response to temperature H01M 10/443](#))
 - 10/633 . . . characterised by algorithms, flow charts, software details or the like
 - 10/635 . . . based on ambient temperature
 - 10/637 . . . characterised by the use of reversible temperature-sensitive devices, e.g. NTC, PTC or bimetal devices; characterised by control of the internal current flowing through the cells, e.g. by switching ([H01M 2/34 takes precedence](#))
 - 10/64 . . characterised by the shape of the cells
 - 10/643 . . . Cylindrical cells
 - 10/647 . . . Prismatic or flat cells, e.g. pouch cells
 - 10/65 . . Means for temperature control structurally associated with the cells
 - 10/651 . . . characterised by parameters specified by a numeric value or mathematical formula, e.g. ratios, sizes or concentrations
 - 10/652 characterised by gradients ([for achieving a desired temperature gradient H01M 10/617](#))
 - 10/653 . . . characterised by electrically insulating or thermally conductive materials
 - 10/654 . . . located inside the innermost case of the cells, e.g. mandrels, electrodes or electrolytes
 - 10/655 . . . Solid structures for heat exchange or heat conduction
 - 10/6551 Surfaces specially adapted for heat dissipation or radiation, e.g. fins or coatings
 - 10/6552 Closed pipes transferring heat by thermal conductivity or phase transition, e.g. heat pipes
 - 10/6553 Terminals or leads
 - 10/6554 Rods or plates
 - 10/6555 arranged between the cells
 - 10/6556 Solid parts with flow channel passages or pipes for heat exchange ([closed pipes H01M 10/6552](#))
 - 10/6557 arranged between the cells
 - 10/656 . . . characterised by the type of heat-exchange fluid
 - 10/6561 Gases
 - 10/6562 with free flow by convection only
 - 10/6563 with forced flow, e.g. by blowers
 - 10/6564 using compressed gas
 - 10/6565 with recirculation or U-turn in the flow path, i.e. back and forth
 - 10/6566 Means within the gas flow to guide the flow around one or more cells, e.g. manifolds, baffles or other barriers ([H01M 10/6565 takes precedence](#))
 - 10/6567 Liquids
 - 10/6568 characterised by flow circuits, e.g. loops, located externally to the cells or cell casings
 - 10/6569 Fluids undergoing a liquid-gas phase change or transition, e.g. evaporation or condensation ([heat pipes H01M 10/6552](#))
 - 10/657 . . . by electric or electromagnetic means
 - 10/6571 Resistive heaters ([arrangements for heating the battery by its resistance to the internal current H01M 10/637](#))
 - 10/6572 Peltier elements or thermoelectric devices
 - 10/658 . . . by thermal insulation or shielding
 - 10/659 . . . by heat storage or buffering, e.g. heat capacity or liquid-solid phase changes or transition
 - 10/6595 . . . by chemical reactions other than electrochemical reactions of the cells, e.g. catalytic heaters or burners
 - 10/66 . . Heat-exchange relationships between the cells and other systems, e.g. central heating systems or fuel cells
 - 10/663 . . . the system being an air-conditioner or an engine
 - 10/667 . . . the system being an electronic component, e.g. a CPU, an inverter or a capacitor
 - 12/00 Hybrid cells; Manufacture thereof ([hybrid capacitors H01G 11/00](#))**
- NOTES**
1. This group does not cover hybrid cells comprising capacitor electrodes and battery electrodes, which are covered by group [H01G 11/00](#)
 2. In this group, hybrid cells are electrochemical generators having two different types of half-cells, the half-cell being an electrode-electrolyte combination of either a primary, a secondary or a fuel cell.
- WARNING**
- Group [H01M 12/00](#) is impacted by reclassification into group [H01G 11/00](#) – [H01G 11/86](#).
- All groups listed in this Warning should be considered in order to perform a complete search.

12/005 (Frozen)	<ul style="list-style-type: none"> • {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)} <p><u>WARNING</u></p> <p>Group H01M 12/005 is no longer used for the classification of documents as of January 1, 2019.</p> <p>The content of this groups is being reclassified into H01G 11/00 - H01G 11/86.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>	2200/20	<ul style="list-style-type: none"> • Pressure-sensitive devices
		2200/30	<ul style="list-style-type: none"> • Preventing polarity reversal
		2220/00	Batteries for particular applications
		2220/10	<ul style="list-style-type: none"> • Batteries in stationary systems, e.g. emergency power source in plant
		2220/20	<ul style="list-style-type: none"> • Batteries in motive systems, e.g. vehicle, ship, plane
		2220/30	<ul style="list-style-type: none"> • Batteries in portable systems, e.g. mobile phone, laptop
		2250/00	Fuel cells for particular applications; Specific features of fuel cell system
		2250/10	<ul style="list-style-type: none"> • Fuel cells in stationary systems, e.g. emergency power source in plant
		2250/20	<ul style="list-style-type: none"> • Fuel cells in motive systems, e.g. vehicle, ship, plane
		2250/30	<ul style="list-style-type: none"> • Fuel cells in portable systems, e.g. mobile phone, laptop
		2250/40	<ul style="list-style-type: none"> • Combination of fuel cells with other energy production systems
		2250/402	<ul style="list-style-type: none"> • . . Combination of fuel cell with other electric generators (combination of fuel cells with other electrochemical generator H01M 16/003)
		2250/405	<ul style="list-style-type: none"> • . . Cogeneration of heat or hot water
		2250/407	<ul style="list-style-type: none"> • . . Combination of fuel cells with mechanical energy generators
		2300/00	Electrolytes
		2300/0002	<ul style="list-style-type: none"> • Aqueous electrolytes
		2300/0005	<ul style="list-style-type: none"> • . . Acid electrolytes
		2300/0008	<ul style="list-style-type: none"> • . . . Phosphoric acid-based
		2300/0011	<ul style="list-style-type: none"> • . . . Sulfuric acid-based
		2300/0014	<ul style="list-style-type: none"> • . . Alkaline electrolytes
		2300/0017	<ul style="list-style-type: none"> • Non-aqueous electrolytes
		2300/002	<ul style="list-style-type: none"> • . . Inorganic electrolyte
		2300/0022	<ul style="list-style-type: none"> • . . . Room temperature molten salts
		2300/0025	<ul style="list-style-type: none"> • . . Organic electrolyte
		2300/0028	<ul style="list-style-type: none"> • . . . characterised by the solvent
		2300/0031	<ul style="list-style-type: none"> • Chlorinated solvents
		2300/0034	<ul style="list-style-type: none"> • Fluorinated solvents
		2300/0037	<ul style="list-style-type: none"> • Mixture of solvents
		2300/004	<ul style="list-style-type: none"> • Three solvents
		2300/0042	<ul style="list-style-type: none"> • Four or more solvents
		2300/0045	<ul style="list-style-type: none"> • . . . Room temperature molten salts comprising at least one organic ion
		2300/0048	<ul style="list-style-type: none"> • . . Molten electrolytes used at high temperature
		2300/0051	<ul style="list-style-type: none"> • . . . Carbonates
		2300/0054	<ul style="list-style-type: none"> • . . . Halogenides
		2300/0057	<ul style="list-style-type: none"> • Chlorides
		2300/006	<ul style="list-style-type: none"> • . . . Hydroxides
		2300/0062	<ul style="list-style-type: none"> • . . . Nitrates
		2300/0065	<ul style="list-style-type: none"> • . . Solid electrolytes
		2300/0068	<ul style="list-style-type: none"> • . . . inorganic
		2300/0071	<ul style="list-style-type: none"> • Oxides
		2300/0074	<ul style="list-style-type: none"> • Ion conductive at high temperature
		2300/0077	<ul style="list-style-type: none"> • based on zirconium oxide
		2300/008	<ul style="list-style-type: none"> • Halides
		2300/0082	<ul style="list-style-type: none"> • . . . Organic polymers
		2300/0085	<ul style="list-style-type: none"> • Immobilising or gelification of electrolyte
		2300/0088	<ul style="list-style-type: none"> • Composites
		2300/0091	<ul style="list-style-type: none"> • . . in the form of mixtures
		2300/0094	<ul style="list-style-type: none"> • . . in the form of layered products, e.g. coatings
		2300/0097	<ul style="list-style-type: none"> • . . . with adhesive layers
12/002	<ul style="list-style-type: none"> • Details (of non-active parts H01M 2/00; of electrodes H01M 4/00) 		
12/04	<ul style="list-style-type: none"> • composed of a half-cell of the fuel-cell type and of a half-cell of the primary-cell type 		
12/06	<ul style="list-style-type: none"> • . . with one metallic and one gaseous electrode 		
12/065	<ul style="list-style-type: none"> • . . . {with plate-like electrodes or stacks of plate-like electrodes} 		
12/08	<ul style="list-style-type: none"> • composed of a half-cell of a fuel-cell type and a half-cell of the secondary-cell type 		
12/085	<ul style="list-style-type: none"> • . . {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		
	<p><u>NOTE</u></p> <p>This group does not cover solar cells, photocells, photoelectrochemical cells or photovoltaic cells, which are covered by the following groups:</p> <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • {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	<ul style="list-style-type: none"> • {of fuel cells with other electrochemical devices, e.g. capacitors, electrolyzers} 		
16/006	<ul style="list-style-type: none"> • . . {of fuel cells with rechargeable batteries} 		
2200/00	Safety devices for primary or secondary batteries		
2200/10	<ul style="list-style-type: none"> • Temperature sensitive devices 		
2200/101	<ul style="list-style-type: none"> • . . Bimetal 		
2200/103	<ul style="list-style-type: none"> • . . Fuse 		
2200/105	<ul style="list-style-type: none"> • . . NTC 		
2200/106	<ul style="list-style-type: none"> • . . PTC 		
2200/108	<ul style="list-style-type: none"> • . . Normal resistors 		