

CPC**COOPERATIVE PATENT CLASSIFICATION****H01M****PROCESSES OR MEANS, e.g. BATTERIES, FOR THE DIRECT CONVERSION OF CHEMICAL INTO ELECTRICAL ENERGY**

(electrochemical processes or apparatus in general [C25](#); semiconductor or other solid state devices for converting light or heat into electrical energy [H01L](#), e.g. [H01L 31/00](#), [H01L 35/00](#), [H01L 37/00](#))

NOTE

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

H01M 2/00**Constructional details or processes of manufacture of the non-active parts****H01M 2/02**

- . Cases, jackets or wrappings ([working of plastics or substances in plastic state B29](#))

H01M 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](#))}

H01M 2002/0205

- . . . {Cases with a shape not covered by groups [H01M 2/0207](#) to [H01M 2/0235](#)}

H01M 2/0207

- . . . {Flat-shaped cells or batteries of flat cells ([H01M 2/0222 takes precedence](#))}

H01M 2/021

- {with both terminals passing through the case or cover}

H01M 2/0212

- {with plate-like or sheet-like terminals ([H01M 2/0215 takes precedence](#))}

H01M 2/0215

- {with window-shaped terminals}

H01M 2/0217

- . . . {Cases of prismatic shape}

H01M 2/022

- . . . {Cases of cylindrical or round shape}

H01M 2/0222

- {Button or coin cell cases}

H01M 2/0225

- {with cup-shaped terminals}

H01M 2/0227

- {with both cup-shaped terminals}

H01M 2/023

- {with one cup-shaped terminal}

H01M 2/0232

- {with a passing-through terminal ([H01M 2/0235 takes precedence](#))}

H01M 2/0235

- {with a collector centrally disposed in the active mass, e.g. Leclanch cells}

H01M 2/0237

- . . {for large-sized cells or batteries, e.g. L.I.S. batteries, traction or motive power type or standby power batteries ([H01M 2/025 takes precedence](#))}

H01M 2/024

- . . . {Details}

H01M 2/0242

- . . . {Monobloc manufactured cases comprising multiple compartments}

H01M 2/0245

- . . . {Assembly of different cases, i.e. modular battery or cases particularly provided with means for assembling}

H01M 2/0247

- {sealed to each other in a non-detachable manner}

H01M 2/025

- . . {for cells or batteries working under specific conditions such as high temperature, gas diffusion, external electrolyte circulation, external supply of reactants}

H01M 2/0252

- . . . {High- temperature cells or batteries, e.g. Na-S cells, Li-Cl₂ cells}

H01M 2/0255

- . . . {Hybrid cells or batteries ([H01M 2/0222 takes precedence](#))}

H01M 2/0257

- . . {characterised by the material}

H01M 2/026	. . .	{for small-sized cells or batteries, batteries or cells for portable equipment}
H01M 2/0262	. . .	{for large-sized cells or batteries, batteries or cells for traction or motive power or standby power}
H01M 2/0265	. . .	{for high-temperature cells}
H01M 2/0267	. . .	{of wrappings, outside coatings, jackets around completely closed cell elements}
H01M 2/027	. . .	{Casing material forming terminal of the cell}
H01M 2/0272	. . . .	{characterized by the internal coating or internal conductive layer}
H01M 2/0275	. . .	{of flexible envelopes or bags around open cell elements}
H01M 2/0277	. . .	{Insulating material (H01M 2/029 takes precedence)}
H01M 2/028	. . . .	{being one layer}
H01M 2/0282	. . . .	{having particulate or reinforced material}
H01M 2/0285	. . .	{Conductive material}
H01M 2/0287	. . .	{comprising layers}
H01M 2/029	. . . .	{consisting only of insulating material}
H01M 2/0292	. . . .	{characterised by the external coating on the casing}
H01M 2/0295	. . .	{Composite material consisting of mixed or dispersed phases}
H01M 2002/0297	. . .	{characterised by physical parameters}
H01M 2/04	. .	Lids or covers
H01M 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)}
H01M 2/0408	. . . .	{Crimp-sealed cells or batteries; Cells or batteries with turned-over edges}
H01M 2/0413	. . . .	{provided with an intermediary sealing member between the crimped or curled edges (H01M 2/0417 takes precedence)}
H01M 2/0417	. . . .	{comprising an insulating cover provided with an axial bore for receiving a central current collector}
H01M 2/0421	. . . . .	{with an external conductive cover}
H01M 2/0426	. . . .	{with a metallic cover of which the borders are soldered or welded with the case}
H01M 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)}
H01M 2/0434	. . . .	{Methods for assembling case and cover}
H01M 2/0439	. . . .	{without provisions for disassembling}
H01M 2/0443	. . .	{for cells or batteries working under specific conditions such as high temperature, gas diffusion, external electrolyte circulation, external supply of reactants}
H01M 2/0447	. . . .	{High-temperature cells or batteries}
H01M 2/0452	. . . .	{Hybrid cells or batteries}
H01M 2/0456	. . .	{characterised by the shape}
H01M 2/046	. . . .	{Disk-like lids for cylindrical batteries}
H01M 2/0465	. . . .	{Button cell lids}
H01M 2/0469	. . . .	{Lids for flat or sheet-like batteries}

H01M 2/0473	. . . . {Lids for prismatic cells}
H01M 2/0478	. . . {characterised by the material}
H01M 2/0482	. . . . {Insulating materials}
H01M 2/0486	. . . . {Conducting materials}
H01M 2/0491	. . . . {characterised by the coating}
H01M 2/0495	. . . . {Conductive coating material}
H01M 2/06	. . Arrangements for introducing electric connectors into or through cases
H01M 2/065	. . . {using glass or ceramic sealing material}
H01M 2/08	. . Sealing materials
H01M 2/10	. Mountings; Suspension devices; Shock absorbers; Transport or carrying devices; Holders (structural combination of accumulators with charging apparatus H01M 10/46)
H01M 2/1005	. . {Carrying devices}
H01M 2/1011	. . . {using the terminals or connecting links}
H01M 2/1016	. . {Cabinets, cases, fixing devices, adapters, racks or battery packs}
H01M 2/1022	. . . {for miniature batteries or batteries for portable equipment (batteries in portable systems H01M 2220/30)}
H01M 2/1027	. . . . {with the possibility of incorporating batteries of different sizes}
H01M 2/1033	. . . . {providing adapters around the batteries}
H01M 2/1038	. . . . {for button cells}
H01M 2/1044	. . . . {forming a whole with or incorporated in or fixed to the electronic appliance}
H01M 2/105	. . . . {for cells of cylindrical configuration}
H01M 2/1055	. . . . {forming a whole with or incorporated in or fixed to the electronic appliance}
H01M 2/1061	. . . . {for cells of prismatic configuration or for sheet-like batteries}
H01M 2/1066	. . . . {forming a whole with or incorporated in or fixed to the electronic appliance}
H01M 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)}
H01M 2/1077	. . . . {Racks, groups of several batteries (H01M 2/1088 takes precedence)}
H01M 2/1083	. . . . {Fixing on vehicles}
H01M 2/1088	. . . . {for accumulators working at high temperature}
H01M 2/1094	. . {Particular characteristics of materials used to isolate the battery from its environment, e.g. thermal insulation, corrosion resistance, pressure resistance, electrolyte leakage}
H01M 2/12	. Vent plugs or other mechanical arrangements for facilitating escape of gases
H01M 2/1205	. . {Vent arrangements incorporated in vent plugs or multiplug systems detachable from the battery or cell}
H01M 2/1211	. . . {Multiplug systems or arrangements; Plurality of plugs surrounded by a common cover}
H01M 2/1217	. . . . {in the shape of a one-piece member}

- H01M 2/1223 . . {Vent arrangements of resealable design ([H01M 2/1205](#),
[H01M 2/1247-H01M 2/1294](#) take precedence)}
- H01M 2/1229 . . . {comprising a deformable, elastic or flexible valve member}
- H01M 2/1235 . . {Emergency or safety arrangements of non-resealable design ([H01M 2/1205](#),
[H01M 2/1247-H01M 2/1294](#) take precedence)}
- H01M 2/1241 . . . {in the form of rupturable membranes or weakened parts, e.g. pierced with the
aid of a sharp member}
- H01M 2/1247 . . {Explosion- or splash-preventing means contained in the head space of the battery,
e.g. means floating on the electrolyte}
- H01M 2/1252 . . {comprising elongated, tortuous or labyrinth-shaped exhaust passages in the
battery cover or case; Double cover vent systems}
- H01M 2/1258 . . {containing electrolyte neutralising or absorbing means}
- H01M 2/1264 . . {comprising gas-pervious parts or elements}
- H01M 2/127 . . . {as flame arrester or ignition preventing means}
- H01M 2/1276 . . {Spring-loaded vent valves}
- H01M 2/1282 . . {Thermally responsive or sensitive vent means}
- H01M 2/1288 . . {Film- or sheet-like elastic valve members optionally coated with non-drying glue}
- H01M 2/1294 . . {Slit, perforated or punctured elastic valve members}
- H01M 2/14 . Separators; Membranes; Diaphragms; Spacing elements
- H01M 2/145 . . {Manufacturing processes}
- H01M 2/16 . . characterised by the material
- H01M 2/1606 . . . {comprising fibrous material}
- H01M 2/1613 {Inorganic fibrous material}
- H01M 2/162 {Organic fibrous material}
- H01M 2/1626 {Natural fibres, e.g. cotton, cellulose}
- H01M 2/1633 {Mixtures of inorganic and organic fibres}
- H01M 2/164 {comprising non-fibrous material ([H01M 2/1606](#) takes precedence)}
- H01M 2/1646 {Inorganic non-fibrous material}
- H01M 2/1653 {Organic non-fibrous material}
- H01M 2/166 {Mixtures of inorganic and organic non-fibrous material}
- H01M 2/1666 {comprising a non-fibrous layer and a fibrous layer superimposed on one
another}
- H01M 2/1673 {Electrode-separator combination}
- H01M 2/168 {with adhesive layers between electrodes and separators}
- H01M 2/1686 {Separators having two or more layers of either fibrous or non-fibrous materials}
- H01M 2/1693 {Wood}
- H01M 2/18 . . characterised by the shape
- H01M 2/185 . . . {Separators made of one single microscopic fiber}
- H01M 2/20 . Current conducting connections for cells
- H01M 2/202 . . {Interconnectors for or interconnection of the terminals of adjacent or distinct
batteries or cells}

- H01M 2/204 . . . {of small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment}
- H01M 2/206 . . . {of large-sized cells or batteries, e.g. L.I.S. batteries, traction or motive power type or standby power batteries}
- H01M 2/208 . . . {for cells or batteries working under specific conditions such as high temperature, gas diffusion, external electrolyte circulation, external supply of reactants}
- H01M 2/22 . . Fixed connections, i.e. not intended for disconnection
- H01M 2/24 . . . Intercell connections through partitions, e.g. in a battery case
- H01M 2/26 . . . Electrode connections
- H01M 2/263 {Electrode connections overlying wounded or folded electrode stacks}
- H01M 2/266 {Interconnections of several platelike electrodes in parallel, e.g. electrode pole straps or bridges}
- H01M 2/28 for lead-acid accumulators
- H01M 2/30 . . Terminals
- H01M 2/302 . . . {Terminal post members on carbon electrodes; Machines or processes for applying said terminal post members, e.g. capping of carbon rods}
- H01M 2/305 . . . {Poles or terminals for L.I.S, traction or motive power type or standby power batteries}
- H01M 2/307 {the poles being connected and passing through hollow metallic terminals, e.g. terminal bushings}
- H01M 2/32 . . Methods or arrangements for affording protection against corrosion; Selection of materials therefor
- H01M 2/34 . . with provision for preventing undesired use or discharge, {e.g. complete cut of current (safety devices [H01M 2200/00](#))}
- H01M 2/341 . . . {Anti-theft provisions}
- H01M 2/342 . . . {Protection against polarity reversal}
- H01M 2/344 . . . {Guarantee labels or covers}
- H01M 2/345 . . . {in response to pressure}
- H01M 2/347 . . . {in response to shock}
- H01M 2/348 . . . {in response to temperature}
- H01M 2/36 . . arrangements for filling, topping-up or emptying cases with or of liquid, e.g. for filling with electrolytes, for washing-out
- H01M 2/361 . . . {Filling of small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment}
- H01M 2/362 . . . {Filling or topping up of large-sized cells or batteries, e.g. L.I.S. batteries, traction or motive power type or standby power batteries}
- H01M 2/364 . . . {Removing or drainage of electrolyte; Cleaning battery or cell cases}
- H01M 2/365 . . . {means or methods for closing or sealing the liquid supply hole}
- H01M 2/367 . . . {with means for preventing spilling of liquid or electrolyte , e.g. when the battery is tilted or turned over}
- H01M 2/368 {by closing the vent passages with a valve}
- H01M 2/38 . . Arrangements for moving electrolytes
- H01M 2/385 . . . {Electrolyte stirring by action of gases on or in the electrolyte}

H01M 2/40 . . with external circulating path ([H01M 8/04](#) takes precedence)

H01M 4/00

Electrodes (electrodes for electrolytic processes [C25](#), {electrodes for hybrid or electric double capacitor [H01G 11/22](#)})

H01M 4/02 . Electrodes composed of or comprising active material

H01M 2004/021 . . {Physical characteristics, e.g. porosity, surface area}

H01M 2004/022 . . {Electrodes made of one single microscopic fiber}

H01M 2004/023 . . {Gel electrode}

H01M 2004/024 . . {Insertable electrodes}

H01M 2004/025 . . {with shapes other than plane or cylindrical}

H01M 2004/026 . . {characterised by the polarity}

H01M 2004/027 . . . {Negative electrodes}

H01M 2004/028 . . . {Positive electrodes}

H01M 2004/029 . . . {Bipolar electrodes}

H01M 4/04 . . Processes of manufacture in general

H01M 4/0402 . . . {Methods of deposition of the material}

H01M 4/0404 {by coating on electrode collectors}

H01M 4/0407 {by coating on an electrolyte layer}

H01M 4/0409 {by a doctor blade method, slip-casting or roller coating}

H01M 4/0411 {by extrusion}

H01M 4/0414 {by screen printing}

H01M 4/0416 {involving impregnation with a solution, dispersion, paste or dry powder ([H01M 4/0438](#) takes precedence)}

H01M 4/0419 {involving spraying}

H01M 4/0421 {involving vapour deposition}

H01M 4/0423 {Physical vapour deposition}

H01M 4/0426 {Sputtering}

H01M 4/0428 {Chemical vapour deposition}

H01M 4/043 . . . {involving compressing or compaction}

H01M 4/0433 {Molding}

H01M 4/0435 {Rolling or calendering}

H01M 4/0438 . . . {by electrochemical processing (electroless electrochemical plating [C23C 18/54](#))}

H01M 4/044 {Activating, forming or electrochemical attack of the supporting material}

H01M 4/0442 {Anodisation, Oxidation (electrolytic coating by anodisation [C25D 9/00](#))}

H01M 4/0445 {Forming after manufacture of the electrode, e.g. first charge, cycling}

H01M 4/0447 {of complete cells or cells stacks}

H01M 4/045 {Electrochemical coating; Electrochemical impregnation}

H01M 4/0452 {from solutions}

H01M 4/0454 {from melts}

H01M 4/0457 {from dispersions or suspensions; Electrophoresis}

- H01M 4/0459 {Electrochemical doping, intercalation, occlusion or alloying}
- H01M 4/0461 {Electrochemical alloying}
- H01M 4/0464 {Electro organic synthesis}
- H01M 4/0466 {Electrochemical polymerisation}
- H01M 4/0469 {Electroforming a self-supporting electrode; Electroforming of powdered electrode material}
- H01M 4/0471 . . . {involving thermal treatment, e.g. firing, sintering, backing particulate active material, thermal decomposition, pyrolysis}
- H01M 4/0473 . . . {Filling tube-or pockets type electrodes; Applying active mass in cup-shaped terminals}
- H01M 4/0476 {with molten material}
- H01M 4/0478 {with dispersions, suspensions or pastes}
- H01M 4/048 {with dry powder}
- H01M 4/0483 . . . {by methods including the handling of a melt ([H01M 4/0438](#), take precedence)}
- H01M 4/0485 {Casting}
- H01M 4/0488 {Alloying}
- H01M 4/049 . . . {Manufacturing of an active layer by chemical means}
- H01M 4/0492 {Chemical attack of the support material}
- H01M 4/0495 {Chemical alloying}
- H01M 4/0497 {Chemical precipitation}
- H01M 4/06 . . Electrodes for primary cells
- H01M 4/08 . . . Processes of manufacture
- H01M 4/10 of pressed electrodes with central core, i.e. dollies
- H01M 4/12 of consumable metal or alloy electrodes ([use of alloy compositions as active materials](#) [H01M 4/38](#))
- H01M 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](#)

- H01M 4/131 . . . Electrodes based on mixed oxides or hydroxides, or on mixtures of oxides or hydroxides, e.g. LiCoOx
- H01M 4/1315 containing halogen atoms, e.g. LiCoOxFy
- H01M 4/133 . . . Electrodes based on carbonaceous material, e.g. graphite-intercalation compounds or CFx
- H01M 4/134 . . . Electrodes based on metals, Si or alloys
- H01M 4/136 . . . Electrodes based on inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoFy
- H01M 4/137 . . . Electrodes based on electro-active polymers
- H01M 4/139 . . . Processes of manufacture

H01M 4/1391	. . . . of electrodes based on mixed oxides or hydroxides, or on mixtures of oxides or hydroxides, e.g. LiCoOx
H01M 4/13915	. . . . . containing halogen atoms, e.g. LiCoOxFy
H01M 4/1393	. . . . of electrodes based on carbonaceous material, e.g. graphite-intercalation compounds or CFx
H01M 4/1395	. . . . of electrodes based on metals, Si or alloys
H01M 4/1397	. . . . of electrodes based on inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoFy
H01M 4/1399	. . . . of electrodes based on electro-active polymers
H01M 4/14	. . Electrodes for lead-acid accumulators
H01M 4/16	. . . Processes of manufacture
H01M 4/18	. . . . of Planté electrodes
H01M 4/20	. . . . of pasted electrodes
H01M 4/21	. . . . . Drying of pasted electrodes
H01M 4/22	. . . . Forming of electrodes
H01M 4/23	. . . . . Drying or preserving electrodes after forming
H01M 4/24	. . Electrodes for alkaline accumulators
H01M 4/242	. . . {Hydrogen storage electrodes}
H01M 4/244	. . . {Zinc electrodes}
H01M 4/246	. . . {Cadmium electrodes}
H01M 4/248	. . . {Iron electrodes}
H01M 4/26	. . . Processes of manufacture
H01M 4/28	. . . . Precipitating active material on the carrier
H01M 4/29	. . . . . by electrochemical methods
H01M 4/30	. . . . Pressing
H01M 4/32	. . . Nickel oxide or hydroxide electrodes
H01M 4/34	. . . Silver oxide or hydroxide electrodes
H01M 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)}
H01M 4/362	. . . {Composites}
H01M 4/364	. . . . {as mixtures}
H01M 4/366	. . . . {as layered products}
H01M 4/368	. . . {Liquid depolarisers}
H01M 4/38	. . . of elements or alloys
H01M 4/381	. . . . {Alkaline or alkaline earth metals elements (H01M 4/40 takes precedence)}
H01M 4/382	. . . . . {Lithium (H01M 4/405 takes precedence)}
H01M 4/383	. . . . {Hydrogen absorbing alloys}
H01M 4/385	. . . . . {of the type LaNi ₅ }
H01M 4/386	. . . . {Silicon or alloys based on silicon}
H01M 4/387	. . . . {Tin or alloys based on tin}

H01M 4/388	. . . . {Halogens}
H01M 4/40	. . . . Alloys based on alkali metals
H01M 4/405	. . . . . {Alloys based on lithium}
H01M 4/42	. . . . Alloys based on zinc
H01M 4/44	. . . . Alloys based on cadmium
H01M 4/46	. . . . Alloys based on magnesium or aluminium
H01M 4/463	. . . . . {Aluminium based}
H01M 4/466	. . . . . {Magnesium based}
H01M 4/48	. . . of inorganic oxides or hydroxides
H01M 4/481	. . . . {of mercury}
H01M 4/483	. . . . {for non-aqueous cells (H01M 4/485 takes precedence)}
H01M 4/485	. . . . of mixed oxides or hydroxides for inserting or intercalating light metals, e.g. LiTi_2O_4 or $\text{LiTi}_2\text{O}_x\text{F}_y$ (H01M 4/505, H01M 4/525 take precedence)
H01M 4/50	. . . . of manganese
H01M 4/502	. . . . . {for non-aqueous cells (H01M 4/505 takes precedence)}
H01M 4/505	. . . . . of mixed oxides or hydroxides containing manganese for inserting or intercalating light metals, e.g. LiMn_2O_4 or $\text{LiMn}_2\text{O}_x\text{F}_y$
H01M 4/52	. . . . of nickel, cobalt or iron
H01M 4/521	. . . . . {of iron for aqueous cells}
H01M 4/523	. . . . . {for non-aqueous cells (H01M 4/525 takes precedence)}
H01M 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 LiCoO_xF_y
H01M 4/54	. . . . of silver
H01M 4/56	. . . . of lead
H01M 4/57	. . . . . of "Grey lead", i.e. powders containing lead and lead oxide
H01M 4/58	. . . of inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoF_y
H01M 4/5805	. . . . {Phosphides}
H01M 4/581	. . . . {Chalcogenides or intercalation compounds thereof}
H01M 4/5815	. . . . . {Sulfides}
H01M 4/582	. . . . {Halogenides}
H01M 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

H01M 4/583	. . . . Carbonaceous material, e.g. graphite-intercalation compounds or CF_x
H01M 4/5835	. . . . . {Comprising fluorine or fluoride salts}
H01M 4/587	. . . . . for inserting or intercalating light metals
H01M 4/60	. . . of organic compounds

H01M 4/602	. . . . {Polymers}
H01M 4/604	. . . . . {containing aliphatic main chain polymers}
H01M 4/606	. . . . . {containing aromatic main chain polymers}
H01M 4/608	. . . . . {containing heterocyclic rings}
H01M 4/62	. . Selection of inactive substances as ingredients for active masses, e.g. binders, fillers
H01M 4/621	. . . {Binders}
H01M 4/622	. . . . {being polymers}
H01M 4/623	. . . . . {fluorinated polymers}
H01M 4/624	. . . {Electric conductive fillers}
H01M 4/625	. . . . {Carbon or graphite}
H01M 4/626	. . . . {Metals}
H01M 4/627	. . . {Expanders for lead-acid accumulators}
H01M 4/628	. . . {Inhibitors, e.g. gassing inhibitors, corrosion inhibitors}
H01M 4/64	. . Carriers or collectors {(current collector for hybrid or electric double layer capacitors H01G 11/66)}
H01M 4/66	. . . Selection of materials
H01M 4/661	. . . . {Metal or alloys, e.g. alloy coatings (H01M 4/669 take precedence)}
H01M 4/662	. . . . . {Alloys (collectors of lead alloys H01M 4/685)}
H01M 4/663	. . . . {containing carbon or carbonaceous materials as conductive part, e.g. graphite, carbon fibres}
H01M 4/664	. . . . {Ceramic materials}
H01M 4/665	. . . . {Composites}
H01M 4/666	. . . . . {in the form of mixed materials (H01M 4/668 takes precedence)}
H01M 4/667	. . . . . {in the form of layers, e.g. coatings}
H01M 4/668	. . . . {Composites of electroconductive material and synthetic resins}
H01M 4/669	. . . . {Steels}
H01M 4/68	. . . . for use in lead-acid accumulators
H01M 4/685	. . . . . {Lead alloys}
H01M 4/70	. . . characterised by shape or form
H01M 4/72	. . . . Grids
H01M 4/73	. . . . . for lead-acid accumulators, e.g. frame plates
H01M 4/74	. . . . . Meshes or woven material; Expanded metal
H01M 4/742	. . . . . . {perforated material}
H01M 4/745	. . . . . . {Expanded metal}
H01M 4/747	. . . . . . {Woven material}
H01M 4/75	. . . . Wires, rods or strips
H01M 4/76	. . . . Containers for holding the active material, e.g. tubes, capsules
H01M 4/762	. . . . . {Porous or perforated metallic containers}
H01M 4/765	. . . . . {Tubular type or pencil type electrodes; tubular or multitubular sheaths or covers of insulating material for said tubular-type electrodes}

H01M 4/767	. . . . . {Multitubular sheaths or covers}
H01M 4/78	. . . . . Shapes other than plane or cylindrical, e.g. helical
H01M 4/80	. . . . . Porous plates, e.g. sintered carriers
H01M 4/801	. . . . . {Sintered carriers}
H01M 4/803	. . . . . {of only powdered material}
H01M 4/805	. . . . . {of powdered and fibrous material}
H01M 4/806	. . . . . {Nonwoven fibrous fabric containing only fibres}
H01M 4/808	. . . . . {Foamed, spongy materials}
H01M 4/82	. . . . . Multi-step processes for manufacturing carriers for lead-acid accumulators (single step processes see the relevant subclasses, e.g. B21D ; B22D)
H01M 4/84	. . . . . involving casting
H01M 4/86	. . . . . Inert electrodes with catalytic activity, e.g. for fuel cells
H01M 4/8605	. . . . . {Porous electrodes}
H01M 4/861	. . . . . {with a gradient in the porosity}
H01M 4/8615	. . . . . {Bifunctional electrodes for rechargeable cells}
H01M 4/8621	. . . . . {containing only metallic or ceramic material, e.g. made by sintering or sputtering}
H01M 4/8626	. . . . . {characterised by the form}
H01M 4/8631	. . . . . {Bipolar electrodes}
H01M 4/8636	. . . . . {with a gradient in another property than porosity (H01M 4/861 takes precedence)}
H01M 4/8642	. . . . . {Gradient in composition}
H01M 4/8647	. . . . . {consisting of more than one material, e.g. consisting of composites}
H01M 4/8652	. . . . . {as mixture}
H01M 4/8657	. . . . . {layered}
H01M 4/8663	. . . . . {Selection of inactive substances as ingredients for catalytic active masses, e.g. binders, fillers}
H01M 4/8668	. . . . . {Binders}
H01M 4/8673	. . . . . {Electrically conductive fillers}
H01M 2004/8678	. . . . . {characterised by the polarity}
H01M 2004/8684	. . . . . {Negative electrodes}
H01M 2004/8689	. . . . . {Positive electrodes}
H01M 2004/8694	. . . . . {Bipolar electrodes}
H01M 4/88	. . . . . Processes of manufacture
H01M 4/8803	. . . . . {Supports for the deposition of the catalytic active composition (H01M 4/90 takes precedence)}
H01M 4/8807	. . . . . {Gas diffusion layers}
H01M 4/881	. . . . . {Electrolytic membranes}
H01M 4/8814	. . . . . {Temporary supports, e.g. decal}
H01M 4/8817	. . . . . {Treatment of supports before application of the catalytic active composition (coated porous composites H01M 8/0245)}
H01M 4/8821	. . . . . {Wet proofing}

H01M 4/8825	. . . {Methods for deposition of the catalytic active composition}
H01M 4/8828	. . . . {Coating with slurry or ink}
H01M 4/8832	. . . . . {Ink jet printing}
H01M 4/8835	. . . . . {Screen printing}
H01M 4/8839	. . . . . {Painting}
H01M 4/8842	. . . . {Coating using a catalyst salt precursor in solution followed by evaporation and reduction of the precursor}
H01M 4/8846	. . . . {Impregnation}
H01M 4/885	. . . . . {followed by reduction of the catalyst salt precursor}
H01M 4/8853	. . . . {Electrodeposition}
H01M 4/8857	. . . . {Casting, e.g. tape casting, vacuum slip casting}
H01M 4/886	. . . . {Powder spraying, e.g. wet or dry powder spraying, plasma spraying}
H01M 4/8864	. . . . {Extrusion}
H01M 4/8867	. . . . {Vapour deposition}
H01M 4/8871	. . . . . {Sputtering}
H01M 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}
H01M 4/8878	. . . {Treatment steps after deposition of the catalytic active composition or after shaping of the electrode being free-standing body}
H01M 4/8882	. . . . {Heat treatment, e.g. drying, baking}
H01M 4/8885	. . . . . {Sintering or firing}
H01M 4/8889	. . . . . {Cosintering or cofiring of a catalytic active layer with another type of layer}
H01M 4/8892	. . . . {Impregnation or coating of the catalyst layer, e.g. by an ionomer}
H01M 4/8896	. . . . {Pressing, rolling, calendering (membrane electrode assemblies H01M 8/1004)}
H01M 4/90	. . Selection of catalytic material
H01M 4/9008	. . . {Organic or organo-metallic compounds}
H01M 4/9016	. . . {Oxides, hydroxides or oxygenated metallic salts}
H01M 4/9025	. . . . {Oxides specially used in fuel cell operating at high temperature, e.g. SOFC}
H01M 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}
H01M 4/9041	. . . {Metals or alloys (H01M 4/92 takes precedence)}
H01M 4/905	. . . . {specially used in fuel cell operating at high temperature, e.g. SOFC}
H01M 4/9058	. . . . . {of noble metals or noble-metal based alloys}
H01M 4/9066	. . . . . {of metal-ceramic composites or mixtures, e.g. cermets}
H01M 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)}
H01M 4/9083	. . . . {on carbon or graphite}
H01M 4/9091	. . . {Unsupported catalytic particles; loose particulate catalytic materials, e.g. in fluidised state}

- H01M 4/92 . . . Metals of platinum group ([H01M 4/94](#), [{H01M 4/9058}](#) take precedence)
- H01M 4/921 {Alloys or mixtures with metallic elements}
- H01M 4/923 {Compounds thereof with non-metallic elements}
- H01M 4/925 {supported on carriers, e.g. powder carriers}
- H01M 4/926 {on carbon or graphite}
- H01M 4/928 {Unsupported catalytic particles; loose particulate catalytic materials, e.g. in fluidised state}
- H01M 4/94 . . Non-porous diffusion electrodes, e.g. palladium membranes, ion exchange membranes
- H01M 4/96 . . Carbon-based electrodes
- H01M 4/98 . . Raney-type electrodes

H01M 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.

- H01M 6/005 . {Devices for making primary cells}
- H01M 6/02 . Details ([of non-active parts H01M 2/00](#); [of electrodes H01M 4/00](#))
- H01M 6/04 . Cells with aqueous electrolyte
- H01M 6/045 . . {characterised by aqueous electrolyte}
- H01M 6/06 . . Dry cells, i.e. cells wherein the electrolyte is rendered non-fluid
- H01M 6/08 . . . with cup shaped electrodes
- H01M 6/085 {of the reversed type, i.e. anode in the centre}
- H01M 6/10 . . . with wound or folded electrodes
- H01M 6/103 {Cells with electrode of only one polarity being folded or wound}
- H01M 2006/106 {Elliptic wound cells}
- H01M 6/12 . . . with flat electrodes
- H01M 6/14 . Cells with non-aqueous electrolyte ([{H01M 10/05 takes precedence}](#))
- H01M 6/145 . . {containing ammonia}
- H01M 6/16 . . with organic electrolyte ([H01M 6/18](#), [{H01M 10/05 take precedence}](#))
- H01M 6/162 . . . {characterised by the electrolyte}
- H01M 6/164 {by the solvent ([organic electrolyte solvents H01M 2300/0028](#))}
- H01M 6/166 {by the solute}
- H01M 6/168 {by additives}
- H01M 6/18 . . with solid electrolyte
- H01M 6/181 . . . {with polymeric electrolytes ([organic polymers electrolytes H01M 2300/0082](#))}
- H01M 6/182 . . . {with halogenide as solid electrolyte ([halide solid electrolytes H01M 2300/008](#))}
- H01M 6/183 {with fluoride as solid electrolyte}
- H01M 6/185 . . . {with oxides, hydroxides or oxysalts as solid electrolytes ([oxides solid electrolyte H01M 2300/0071](#))}

- H01M 6/186 {Only oxysalts-containing solid electrolytes}
- H01M 6/187 . . . {Solid electrolyte characterised by the form (layered solid electrolytes [H01M 2300/0094](#))}
- H01M 6/188 . . . {Processes of manufacture}
- H01M 6/20 . . . working at high temperature (deferred-action thermal cells [H01M 6/36](#))
- H01M 6/22 . Immobilising of electrolyte
- H01M 6/24 . Cells comprising two different electrolytes
- H01M 6/26 . Cells without oxidising active material, e.g. Volta cells
- H01M 6/28 . Standard cells, e.g. Weston cells
- H01M 6/30 . Deferred-action cells
- H01M 6/32 . . activated through external addition of electrolyte or of electrolyte components
- H01M 6/34 . . . Immersion cells, e.g. sea-water cells
- H01M 6/36 . . containing electrolyte and made operational by physical means, e.g. thermal cells (thermoelectric solid state devices [H01L 35/00](#), [H01L 37/00](#))
- H01M 6/38 . . . by mechanical means
- H01M 6/385 {by insertion of electrodes}
- H01M 6/40 . Printed batteries, {e.g. thin film batteries}
- H01M 6/42 . Grouping of primary cells into batteries ([H01M 6/40](#) takes precedence)
- H01M 6/425 . . {Multimode batteries, batteries with "reserve cells"}
- H01M 6/44 . . of tubular or cup-shaped cells
- H01M 6/46 . . of flat cells
- H01M 6/48 . . . with bipolar electrodes
- H01M 6/485 {Side-by-side bipolar batteries}
- H01M 6/50 . Methods or arrangements for servicing or maintenance, e.g. maintaining operating temperature ({cells or batteries combined with safety devices [H01M 2200/00](#)})
- H01M 6/5005 . . {Auxiliary electrodes}
- H01M 6/5011 . . {for several cells simultaneously or successively}
- H01M 6/5016 . . . {Multimode utilisation}
- H01M 6/5022 . . {Arrangements for moving electrodes or separating elements}
- H01M 6/5027 . . {Dummy cells}
- H01M 6/5033 . . {used as charging means for another battery}
- H01M 6/5038 . . {Heating or cooling of cells or batteries}
- H01M 6/5044 . . {Cells or batteries structurally combined with cell condition indicating means ([H01M 2/34](#) takes precedence)}
- H01M 6/505 . . . {Cells combined with indicating means for externally visualisation of the condition, e.g. by change of colour or of light intensity}
- H01M 6/5055 . . . {End of discharge indicated by a voltage step}
- H01M 6/5061 . . . {cells combined with sound indicating means}
- H01M 6/5066 . . {Type recognition}
- H01M 6/5072 . . {Preserving or storing cells}
- H01M 6/5077 . . {Regeneration of reactants or electrolyte}

- H01M 6/5083 . . {Testing apparatus}
- H01M 6/5088 . . {Initial activation; predischARGE; Stabilisation of initial voltage}
- H01M 2006/5094 . . {Aspects relating to capacity ratio of electrolyte/electrodes or anode/cathode}
- H01M 6/52 . Reclaiming serviceable parts of waste cells or batteries, {e.g. recycling}

H01M 8/00**Fuel cells; Manufacture thereof****NOTE**

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

- H01M 8/002 . {Shape, form of a fuel cell}
- H01M 8/004 . . {Cylindrical, tubular or wound}
- H01M 8/006 . . {Flat}
- H01M 8/008 . {Destruction or recycling of fuel cells}
- H01M 8/02 . Details
 - H01M 8/0202 . . {Collectors, separators, interconnectors, e.g. bipolar separators}
 - H01M 8/0204 . . . {Non-porous and characterised by the material}
 - H01M 8/0206 {Metals or alloys}
 - H01M 8/0208 {Alloys}
 - H01M 8/021 {Alloys based on iron}
 - H01M 8/0213 {Gas-tight carbon-containing material}
 - H01M 8/0215 {Glass or ceramic materials}
 - H01M 8/0217 {Complexed oxides, optionally doped, of the type M_1MeO_3 , M_1 being an alkaline earth metal or rare earth metal, Me being a metal, e.g. perovskites}
 - H01M 8/0219 {Chromium complex oxides}
 - H01M 8/0221 {Polymers or organic resins}
 - H01M 8/0223 {Composites}
 - H01M 8/0226 {in the form of mixtures}
 - H01M 8/0228 {in the form of layered products, e.g. coatings}
 - H01M 8/023 . . . {Porous and characterised by the material}
 - H01M 8/0232 {Metals or alloys}
 - H01M 8/0234 {Carbonaceous material}
 - H01M 8/0236 {Glass, ceramics or cermets}
 - H01M 8/0239 {Polymers or organic resins}
 - H01M 8/0241 {Composites}
 - H01M 8/0243 {in the form of mixtures}
 - H01M 8/0245 {in the form of layered products, e.g. coatings}
 - H01M 8/0247 . . . {Porous or non porous and characterised by the form (characterised by a channel configuration [H01M 8/0258](#))}
 - H01M 8/025 {Semicylindrical}

H01M 8/0252	. . . . {Tubular}
H01M 8/0254	. . . . {Corrugated or undulate shaped}
H01M 8/0256	. . . . {Vias, i.e. connector passing through the separator material}
H01M 8/0258	. . . {Porous or non-porous and characterised by a channel configuration, i.e. by the flow field}
H01M 8/026	. . . . {Grooves characteristics, pitch, depth}
H01M 8/0263	. . . . {Meander or serpentine path}
H01M 8/0265	. . . . {Variable section of reactant channel}
H01M 8/0267	. . . {Heating or cooling facilities in the separators, collectors or interconnectors}
H01M 8/0269	. . . {Separators, collectors or interconnectors including a printed circuit board}
H01M 8/0271	. . {of surrounding electrodes, matrices, membranes or fuel cell elements with sealing or supporting material}
H01M 8/0273	. . . {in the form of a frame; Frame materials; Way of attaching to frames}
H01M 8/0276	. . . {Seals characterised by their form}
H01M 8/0278	. . . . {O-rings}
H01M 8/028	. . . {Seals characterised by their composition}
H01M 8/0282	. . . . {Inorganic material}
H01M 8/0284	. . . . {Organic resins or polymers}
H01M 8/0286	. . . {Process of seal formation}
H01M 8/0289	. . {of membranes or electrolyte holding means}
H01M 8/0291	. . . {Matrices; Diaphragms; Membranes}
H01M 8/0293	. . . . {for immobilising electrolyte solutions}
H01M 8/0295	. . . . {for immobilising electrolyte melts}
H01M 8/0297	. . {of joining electrodes, reservoir layers, heat exchange units or bipolar separators to each other}
H01M 8/04	. Auxiliary arrangements or processes, e.g. for control of pressure, for circulation of fluids
H01M 8/04007	. . {Arrangements or means or processes related to heat exchange or temperature measurements (methods for controlling fuel cells or fuel cell systems H01M 8/04298)}
H01M 8/04014	. . . {by a gaseous fluid or by combustion of reactants, e.g. bigascooling}
H01M 8/04022	. . . . {Heating by combustion}
H01M 8/04029	. . . {by a liquid fluid}
H01M 8/04037	. . . {Electrical heating}
H01M 8/04044	. . . {Coolant purification}
H01M 8/04052	. . . {Storage of heat in the fuel cell system}
H01M 8/04059	. . . {Evaporative processes for the cooling of a fuel cell}
H01M 8/04067	. . . {Heat exchange or temperature measuring elements, thermal insulation, e.g. heat pipes, heat pumps, fins}
H01M 8/04074	. . . . {Heat exchange unit structures specially adapted for fuel cell (heat exchanger F28 , heat exchangers for fuel cells F28D 2021/0043)}
H01M 8/04082	. . {Arrangements or means for reactant regulation. E.g. pressure or concentration}

H01M 8/04089	. . . {of gaseous reactants}
H01M 8/04097	. . . . {with recycling of the reactants (H01M 8/04119 , H01M 8/04104 take precedence)}
H01M 8/04104	. . . . {Regulation of differential pressures}
H01M 8/04111	. . . . {Using a compressor turbine assembly}
H01M 8/04119	. . . . {with simultaneous supply or evacuation of electrolyte; Humidifying or dehumidifying}
H01M 8/04126	. . . . . {Humidifying}
H01M 8/04134	. . . . . . {by coolants}
H01M 8/04141	. . . . . . {by water containing exhaust gases}
H01M 8/04149	. . . . . . {by diffusion, e.g. making use of membranes}
H01M 8/04156	. . . . . . {with product water removal}
H01M 8/04164	. . . . . . {by condensers, gas-liquid separators or filters}
H01M 8/04171	. . . . . . {using adsorbents, wicks or hydrophilic material}
H01M 8/04179	. . . . . . {by purging or increasing flow or pressure of reactants}
H01M 8/04186	. . . {of liquid- or electrolyte-charged reactants}
H01M 8/04194	. . . . {Concentration measuring cells}
H01M 8/04201	. . . {Reactant storage and supply, e.g. means for feeding, pipes}
H01M 8/04208	. . . . {Cartridges, cryogenic media or cryogenic reservoirs}
H01M 8/04216	. . . . {characterised by the choice for a specific material, e.g. carbon, hydride, absorbent}
H01M 8/04223	. . . {Arrangements or means particularly during start-up or shut-down; Depolarisation or activation treatment, e.g. purging; Short-circuiting means for defective fuel cells}
H01M 8/04231	. . . . {Purging of the reactants}
H01M 8/04238	. . . . {Depolarisation}
H01M 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)}
H01M 8/04253	. . . . {Means for solving freezing problems}
H01M 8/04261	. . . . {Preventing means for fuel crossover}
H01M 8/04268	. . . . {Heating of fuel cells during the start-up of the fuel cells}
H01M 8/04276	. . {Arrangements or means related to the management of the electrolyte stream, e.g. heat exchange (H01M 8/04119 takes precedence; Treatment of electrolyte residue H01M 8/0693)}
H01M 8/04283	. . . {Supply means of electrolyte to or in matrix-fuel cells}
H01M 8/04291	. . {Electrolyte- or water-management of solid electrolyte cells (H01M 8/04119 takes precedence)}
H01M 8/04298	. . {Methods for controlling fuel cells or fuel cell systems (means for control H01M 8/04007 to H01M 8/04291)}
H01M 8/04305	. . . {Modelling, demonstration models of fuel cells, e.g. for training purposes}
H01M 8/04313	. . . {characterised by variables to be detected or calculated, failure or abnormal functionality of the system}
H01M 8/0432	. . . . {Temperature including ambient temperature}

H01M 8/04328	. . . . .	{of anode reactants at the inlet or inside the fuel cell}
H01M 8/04335	. . . . .	{of cathode reactants at the inlet or inside the fuel cell}
H01M 8/04343	. . . . .	{of anode exhausts}
H01M 8/0435	. . . . .	{of cathode exhausts}
H01M 8/04358	. . . . .	{of the coolant}
H01M 8/04365	. . . . .	{of other components of a fuel cell or fuel cell stacks}
H01M 8/04373	. . . . .	{of auxiliary devices, e.g. reformers, compressors, burners}
H01M 8/0438	. . . . .	{Pressure or flow including ambient pressure}
H01M 8/04388	. . . . .	{of anode reactants at the inlet or inside the fuel cell}
H01M 8/04395	. . . . .	{of cathode reactants at the inlet or inside the fuel cell}
H01M 8/04402	. . . . .	{of anode exhausts}
H01M 8/0441	. . . . .	{of cathode exhausts}
H01M 8/04417	. . . . .	{of the coolant}
H01M 8/04425	. . . . .	{at auxiliary devices, e.g. reformers, compressors, burners}
H01M 8/04432	. . . . .	{Pressure differences, e.g. between anode and cathode}
H01M 8/0444	. . . . .	{Concentrations or densities}
H01M 8/04447	. . . . .	{of anode reactants at the inlet or inside the fuel cell}
H01M 8/04455	. . . . .	{of cathode reactants at the inlet or inside the fuel cell}
H01M 8/04462	. . . . .	{of anode exhausts}
H01M 8/0447	. . . . .	{of cathode exhausts}
H01M 8/04477	. . . . .	{of the electrolyte}
H01M 8/04485	. . . . .	{of the coolant}
H01M 8/04492	. . . . .	{Humidity, moisture or water content including ambient humidity}
H01M 8/045	. . . . .	{of anode reactants at the inlet or inside the fuel cell}
H01M 8/04507	. . . . .	{of cathode reactants at the inlet or inside the fuel cell}
H01M 8/04514	. . . . .	{of anode exhausts}
H01M 8/04522	. . . . .	{of cathode exhausts}
H01M 8/04529	. . . . .	{of the electrolyte}
H01M 8/04537	. . . . .	{Electric variables}
H01M 8/04544	. . . . .	{Voltage}
H01M 8/04552	. . . . .	{of the individual fuel cell}
H01M 8/04559	. . . . .	{of fuel cell stacks}
H01M 8/04567	. . . . .	{of auxiliary devices, e.g. batteries, capacitors}
H01M 8/04574	. . . . .	{Current}
H01M 8/04582	. . . . .	{of the individual fuel cell}
H01M 8/04589	. . . . .	{of fuel cell stacks}
H01M 8/04597	. . . . .	{of auxiliary devices, e.g. batteries, capacitors}
H01M 8/04604	. . . . .	{Power, energy, capacity or load}
H01M 8/04611	. . . . .	{of the individual fuel cell}
H01M 8/04619	. . . . .	{of fuel cell stacks}

H01M 8/04626	. . . . .	{of auxiliary devices, e.g. batteries, capacitors}
H01M 8/04634	. . . . .	{Other electric variables, e.g. resistance or impedance}
H01M 8/04641	. . . . .	{of the individual fuel cell}
H01M 8/04649	. . . . .	{of fuel cell stacks}
H01M 8/04656	. . . . .	{of auxiliary devices, e.g. batteries, capacitors}
H01M 8/04664	. . . . .	{Failure or abnormal functionality}
H01M 8/04671	. . . . .	{of the individual fuel cell}
H01M 8/04679	. . . . .	{of fuel cell stacks}
H01M 8/04686	. . . . .	{of auxiliary devices, e.g. batteries, capacitors}
H01M 8/04694	. . . . .	{characterised by variables to be regulated}
H01M 8/04701	. . . . .	{Temperature}
H01M 8/04708	. . . . .	{of fuel cell reactants}
H01M 8/04716	. . . . .	{of fuel cell exhausts}
H01M 8/04723	. . . . .	{of the coolant}
H01M 8/04731	. . . . .	{of other components of a fuel cell or fuel cell stacks}
H01M 8/04738	. . . . .	{of auxiliary devices, e.g. reformer, compressor, burner}
H01M 8/04746	. . . . .	{Pressure or flow}
H01M 8/04753	. . . . .	{of fuel cell reactants}
H01M 8/04761	. . . . .	{of fuel cell exhausts}
H01M 8/04768	. . . . .	{of the coolant}
H01M 8/04776	. . . . .	{at auxiliary devices, e.g. reformer, compressor, burner}
H01M 8/04783	. . . . .	{Pressure differences, e.g. between anode and cathode}
H01M 8/04791	. . . . .	{Concentrations or densities}
H01M 8/04798	. . . . .	{of fuel cell reactants}
H01M 8/04805	. . . . .	{of fuel cell exhausts}
H01M 8/04813	. . . . .	{of the coolant}
H01M 8/0482	. . . . .	{of the electrolyte}
H01M 8/04828	. . . . .	{Humidity, moisture or water content}
H01M 8/04835	. . . . .	{of fuel cell reactants}
H01M 8/04843	. . . . .	{of fuel cell exhausts}
H01M 8/0485	. . . . .	{of the electrolyte}
H01M 8/04858	. . . . .	{Electric variables}
H01M 8/04865	. . . . .	{Voltage}
H01M 8/04873	. . . . .	{of the individual fuel cell}
H01M 8/0488	. . . . .	{of fuel cell stacks}
H01M 8/04888	. . . . .	{of auxiliary devices, e.g. batteries, capacitors}
H01M 8/04895	. . . . .	{Current}
H01M 8/04902	. . . . .	{of the individual fuel cell}
H01M 8/0491	. . . . .	{of fuel cell stacks}
H01M 8/04917	. . . . .	{of auxiliary devices, e.g. batteries, capacitors}

H01M 8/04925	. . . . . {Power, energy, capacity or load}
H01M 8/04932	. . . . . {of the individual fuel cell}
H01M 8/0494	. . . . . {of fuel cell stacks}
H01M 8/04947	. . . . . {of auxiliary devices, e.g. batteries, capacitors}
H01M 8/04955	. . . . . {Turning on/off, shunting of fuel cells or fuel cell system components (arrangements or means during start-up or shut-down H01M 8/04223)}
H01M 8/04962	. . . . . {Other electric variables e.g. resistance or impedance}
H01M 8/0497	. . . . . {of the individual fuel cell}
H01M 8/04977	. . . . . {of fuel cell stacks}
H01M 8/04985	. . . . . {of auxiliary devices, e.g. batteries, capacitors}
H01M 8/04992	. . . {characterised by the implementation of the control method by mathematical or computational algorithm, e.g. control feedback loop mechanisms, fuzzy logic, neural networks, artificial intelligence}
H01M 8/06	. Combination of fuel cell with means for production of reactants or for treatment of residues
H01M 8/0606	. . {Producing gaseous reactants}
H01M 8/0612	. . . {from carbon containing material}
H01M 8/0618	. . . . {Reforming processes, e.g. autothermal, partial oxidation or steam reforming}
H01M 8/0625	. . . . {in a modular combined reactor/fuel cell structure}
H01M 8/0631	. . . . {Reactor construction specially adapted for combination reactor/fuel cell (Hydrogen C01B 3/00 , reactors for physicochemical processes B01J 19/00)}
H01M 8/0637	. . . . {Direct internal reforming at the anode of the fuel cell}
H01M 8/0643	. . . . {Gasification of solid fuel}
H01M 8/065	. . . {by dissolution of metals or alloys or by dehydrating metallic substance}
H01M 8/0656	. . . {by electrochemical means (H01M 8/065 takes precedence)}
H01M 8/0662	. . {Treatment of gaseous reactants or gaseous residues, e.g. cleaning (humidifying or dehumidifying of gaseous reactants H01M 8/04119)}
H01M 8/0668	. . . {Removal of carbon monoxide or carbon dioxide}
H01M 8/0675	. . . {Removal of sulfur}
H01M 8/0681	. . . {Reactant purification by the use of electrochemical cells}
H01M 8/0687	. . . {Reactant purification by the use of membranes or filters}
H01M 8/0693	. . {Treatment of the electrolyte residue, e.g. reconcentrating}
H01M 8/08	. Fuel cells with aqueous electrolytes
H01M 8/083	. . {Alkaline fuel cells}
H01M 8/086	. . {Phosphoric acid fuel cells [PAFC]}
H01M 8/10	. Fuel cells with solid electrolytes
H01M 8/1002	. . {with anode and cathode gas-diffusion electrodes or electrode layers, e.g. using gaseous or vaporised reactants (H01M 8/12 takes precedence)}
H01M 8/1004	. . . {characterised by the electrode/electrolyte combination}

H01M 8/1006	. . . . {Undulated, corrugated, curved or wave-shaped membrane-electrode-assemblies [MEA]}
H01M 8/1009	. . {with one of the reactants being liquid, solid or liquid-charged (H01M 8/12 takes precedence)}
H01M 8/1011	. . . {Direct methanol fuel cells [DMFC]}
H01M 8/1013	. . . {Other direct alcohol fuel cells [DAFC]}
H01M 8/1016	. . {characterised by the electrolyte material (H01M 8/12 takes precedence)}
H01M 8/1018	. . . {Polymeric electrolyte material}
H01M 8/102	. . . . {characterised by the chemical structure of the main chain of the ion conducting polymer (membrane support H01M 8/1058 , semi-permeable membrane composition B01D 71/00 , ion-exchange membrane C08J 5/22)}

NOTE

Multiple classification is done when two or more heteroatoms from O, P, N, S, Si are present

H01M 8/1023	. . . . . {having only carbon, e.g. Nafion, vinylsulfonic acid, polyarylenes, polystyrenes, polybutadiene-styrene}
H01M 8/1025	. . . . . {having only carbon and oxygen, e.g. polyethers, sulfonated-polyetheretherketones [s-PEEK], sulfonated-polysaccharides, sulfonated-celluloses, sulfonated-polyesters}
H01M 8/1027	. . . . . {having carbon, oxygen and other atoms, e.g. sulfonated-polyethersulfones [s-PES], sulfonated-polyphenyl-quinoxaline [s-PPQ]}
H01M 8/103	. . . . . {having nitrogen, e.g. sulfonated-polybenzimidazoles [s-PBI], polybenzimidazoles with phosphoric acid, sulfonated-polyamides [s-PA], sulfonated polyphosphazenes [s-PPh]}
H01M 8/1032	. . . . . {having sulfur, e.g. sulfonated polyphosphazene [s-PPh]}
H01M 8/1034	. . . . . {having phosphorous, e.g. sulfonated polyphosphazene [s-PPh]}
H01M 8/1037	. . . . . {having silicon, e.g. sulfonated crosslinked polydimethylsiloxane}
H01M 8/1039	. . . . . {being halogenated, e.g. Nafion, sulfonated polyvinylidene fluoride}
H01M 8/1041	. . . . . {Polymer electrolyte composites, mixtures or blends other than copolymers or grafted polymers}
H01M 8/1044	. . . . . {Mixtures of polymers with at least one polymer being ionically conductive}
H01M 8/1046	. . . . . {Mixtures of polymer and additives}
H01M 8/1048	. . . . . {Ion conductive additives, e.g. polybenzimidazole with phosphoric acid, ion conducting particles, heteropolyacids or metal phosphate}
H01M 8/1051	. . . . . {Non ion conductive additives, e.g. stabilizers, SiO ₂ , ZrO ₂ }
H01M 8/1053	. . . . . {Layers of polymers with at least one layer being ionically conductive}
H01M 8/1055	. . . . . {Inorganic layers on the polymer electrolytes, e.g. inorganic coatings}
H01M 8/1058	. . . . . {characterized by a porous support having no ionic conductive properties (membrane immobilizing electrolyte solutions or melts H01M 8/0293 , H01M 8/0295)}
H01M 8/106	. . . . . {Chemical composition of the porous support}
H01M 8/1062	. . . . . {Physical properties of the porous support, e.g. porosity, thickness}

H01M 8/1065	. . . .	{characterized by their form, e.g. perforated, undulated (semi-permeable membranes characterised by their form B01D 69/00)}
H01M 8/1067	. . . .	{characterized by their physical properties, e.g. porosity, ionic conductivity, thickness}
H01M 8/1069	. . . .	{characterized by the manufacturing processes (semi-permeable membrane manufacturing processes B01D 67/00 ; manufacture of ion-exchange membrane C08J 5/22)}
H01M 8/1072	. . . . .	{Chemical reactions, e.g. in-situ polymerisation, in-situ crosslinking}
H01M 8/1074	. . . . .	{Sol-gel processes}
H01M 8/1076	. . . . .	{Micromachining techniques, e.g. masking, etching steps, photolithography}
H01M 8/1079	. . . . .	{Inducing porosity into non porous precursors membranes, e.g. leaching, pore stretching}
H01M 8/1081	. . . . .	{Starting from polymer solutions, dispersions, slurries other than monomer solutions, dispersions, slurries}
H01M 8/1083	. . . . .	{Starting from polymer melts other than monomer melts}
H01M 8/1086	. . . . .	{After-treatment of the membrane other than polymerisation}
H01M 8/1088	. . . . .	{chemical modification, e.g. sulfonation}
H01M 8/109	. . . . .	{thermal other than drying, e.g. sintering}
H01M 8/1093	. . . . .	{mechanical, e.g. pressing, puncturing}
H01M 2008/1095	. .	{Fuel cells with polymeric electrolytes}
H01M 8/1097	. .	{Fuel cells applied on a support, e.g. miniature fuel cell deposited on a silica support}
H01M 8/12	. .	operating at high temperature, e.g. with stabilised ZrO ₂ electrolyte
H01M 8/1206	. . .	{with the anode and the cathode in the form of gas diffusion electrodes}
H01M 8/1213	. . . .	{characterised by the electrodes, the electrode/electrolyte combination or the supporting material}
H01M 8/122	. . . . .	{Undulated, corrugated, curved or wave-shaped membrane electrode assemblies [MEA]}
H01M 8/1226	. . . . .	{Supporting layer characteristics}
H01M 8/1233	. . .	{one of the reactants being solid or liquid}
H01M 8/124	. . .	{characterised by the process of manufacturing or by the material of the electrolyte}
H01M 8/1246	. . . .	{the electrolyte consisting of oxides (solid oxides ion conductive electrolyte H01M 2300/0074)}
H01M 8/1253	. . . . .	{the electrolyte containing zirconium oxide (solid electrolyte based on zirconium oxide H01M 2300/0077)}
H01M 8/126	. . . . .	{the electrolyte containing cerium oxide}
H01M 8/1266	. . . . .	{the electrolyte containing bismuth oxide}
H01M 8/1273	. . . . .	{Fuel cells with solid halide electrolytes (solid halide electrolyte H01M 2300/008)}
H01M 2008/128	. . .	{Fuel cells with solid halide electrolytes}
H01M 8/1286	. . .	{Fuel cells applied on a support, e.g. miniature fuel cells deposited on a silica support}

- H01M 2008/1293 . . . {Fuel cells with solid oxide electrolytes}
- H01M 8/14 . Fuel cells with fused electrolytes
- H01M 8/141 . . {the anode and the cathode being gas-permeable electrodes or electrode layers}
- H01M 8/142 . . . {with matrix-supported or semi-solid matrix-reinforced electrolyte}
- H01M 8/143 . . {with liquid, solid or electrolyte-charged reactants}
- H01M 8/144 . . {characterised by the electrolyte material}
- H01M 8/145 . . . {comprising carbonates}
- H01M 8/146 . . {Fuel cells with molten hydroxide (molten hydroxide electrolyte [H01M 2300/006](#))}
- H01M 2008/147 . . {Fuel cells with molten carbonates}
- H01M 8/148 . . {Measures, other than selecting a specific electrode material, to reduce electrode dissolution}
- H01M 8/16 . Biochemical fuel cells, i.e. cells in which micro-organisms function as catalysts
- H01M 8/18 . Regenerative fuel cells
- H01M 8/182 . . {Regeneration by thermal means}
- H01M 8/184 . . {Regeneration by electrochemical means}
- H01M 8/186 . . . {by electrolytic decomposition of the electrolytic solution or the formed water product}
- H01M 8/188 . . . {by recharging of redox couples containing fluids; Redox flow type batteries}
- H01M 8/20 . Indirect fuel cells, e.g. Redox cells ([H01M 8/18](#) takes precedence)
- H01M 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
- H01M 8/222 . . {Fuel cells in which the fuel is based on compounds containing nitrogen, e.g. hydrazine, ammonia}
- H01M 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}
- H01M 8/227 . . {Dialytic cells or batteries; Reverse electrodialysis cells or batteries}
- H01M 8/24 . Grouping of fuel cells into batteries
- H01M 8/2405 . . {comprising spaced diffusion electrodes or electrode layers with interposed electrolyte layer or electrolyte compartment}
- H01M 8/241 . . . {with solid or matrix-supported electrolyte}
- H01M 8/2415 {External manifolded battery stock ([H01M 8/2425](#), [H01M 8/244](#) take precedence)}
- H01M 8/242 {comprising framed electrodes or intermediary frame-like gaskets ([H01M 8/2425](#), [H01M 8/244](#) take precedence)}
- H01M 8/2425 {High-temperature cells with solid electrolyte}
- H01M 8/243 {of tubular or cylindrical configuration}
- H01M 8/2435 {with monolithic core structure, e.g. honeycombs}
- H01M 8/244 {with matrix-supported molten electrolyte}
- H01M 8/2445 . . . {comprising spaced diffusion electrodes or electrode layers with interposed electrolyte compartment with possible electrolyte supply or circulation}
- H01M 8/245 {comprising framed electrodes or intermediary frame-like gaskets}
- H01M 8/2455 . . {with liquid, solid or electrolyte-charged reactants}

- H01M 8/246 . . . {with framed electrodes or intermediary frame-like gaskets}
- H01M 8/2465 . . {Details of fuel cell stacks}
- H01M 8/247 . . . {Arrangements for tightening a stack, for accommodation of a stack in a tank, for assembling different tanks}
- H01M 8/2475 {Enclosures, casings or containers of fuel cells}
- H01M 8/248 {Compression means of the fuel cell stack}
- H01M 8/2485 . . . {Arrangements for sealing or mounting external manifolds around a stack; Manifold structure and material}
- H01M 8/249 . . {comprising a plurality of stacks, e.g. modular assembly}
- H01M 8/2495 . . . {of fuel cells of different type}

H01M 10/00 Secondary cells; Manufacture thereof

NOTE

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

- H01M 10/02 . Details (of non-active parts [H01M 2/00](#); of electrodes [H01M 4/00](#))
- H01M 10/04 . Construction or manufacture in general ([H01M 10/12](#), [H01M 10/28](#), [H01M 10/38](#) take precedence)
- H01M 10/0404 . . {Machines for assembling batteries}
- H01M 10/0409 . . . {for cells with wound electrodes}
- H01M 10/0413 . . {Large-sized flat cells or batteries for motive or stationary systems with plate-like electrodes}
- H01M 10/0418 . . . {with bipolar electrodes}
- H01M 10/0422 . . {Cells or battery with cylindrical casing}
- H01M 10/0427 . . . {Button cells}
- H01M 10/0431 . . {Cells with wound or folded electrodes ([H01M 10/045](#) takes precedence)}
- H01M 10/0436 . . {Small-sized flat cells or batteries portable equipment}
- H01M 10/044 . . . {with bipolar electrodes}
- H01M 10/0445 . . {Multimode batteries, e.g. containing auxiliary cells or electrodes switchable in parallel or series connections}
- H01M 10/045 . . {Cells or batteries with folded plate-like electrodes}
- H01M 10/0454 . . . {Cells or batteries with electrodes of only one polarity folded}
- H01M 10/0459 . . {Cells or batteries with folded separator between plate-like electrodes}
- H01M 10/0463 . . {Cells or batteries with horizontal or inclined electrodes}
- H01M 10/0468 . . {Compression means for stacks of electrodes and separators}
- H01M 10/0472 . . {Vertically superposed cells with vertically disposed plates}
- H01M 10/0477 . . {with circular plates}
- H01M 10/0481 . . {Compression means other than compression means for stacks of electrodes and separators}
- H01M 10/0486 . . {Frames for plates or membranes}
- H01M 10/049 . . {Processes for forming or storing electrodes in the battery container}

- H01M 2010/0495 . . {Nanobatteries}
- H01M 10/05 . Accumulators with non-aqueous electrolyte ([H01M 10/39 takes precedence](#))
- H01M 10/052 . . Li-accumulators
- H01M 10/0525 . . . Rocking-chair batteries, i.e. batteries with lithium insertion or intercalation in both electrodes; Lithium-ion batteries
- H01M 10/054 . . Accumulators with insertion or intercalation of metals other than lithium, e.g. with magnesium or aluminium
- H01M 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](#))}
- H01M 10/0561 . . . the electrolyte being constituted of inorganic materials only
- H01M 10/0562 Solid materials
- H01M 10/0563 Liquid materials, e.g. for Li-SOCl₂ cells
- H01M 10/0564 . . . the electrolyte being constituted of organic materials only
- H01M 10/0565 Polymeric materials, e.g. gel-type or solid-type
- H01M 10/0566 Liquid materials
- H01M 10/0567 characterised by the additives
- H01M 10/0568 characterised by the solutes
- H01M 10/0569 characterised by the solvents
- H01M 10/058 . . Construction or manufacture
- H01M 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
- H01M 10/0585 . . . of accumulators having only flat construction elements, i.e. flat positive electrodes, flat negative electrodes and flat separators
- H01M 10/0587 . . . of accumulators having only wound construction elements, i.e. wound positive electrodes, wound negative electrodes and wound separators
- H01M 10/06 . Lead-acid accumulators ([semi-lead accumulators H01M 10/20](#))
- H01M 10/08 . . Selection of materials as electrolytes
- H01M 10/10 . . . Immobilising of electrolyte
- H01M 10/12 . . Construction or manufacture
- H01M 10/121 . . . {Valve regulated lead acid batteries [VRLA]}
- H01M 10/122 . . . {Multimode batteries}
- H01M 10/123 . . . {Cells or batteries with cylindrical casing}
- H01M 10/124 {Button cells}
- H01M 10/125 . . . {Cells or batteries with wound or folded electrodes}
- H01M 10/126 . . . {Small-sized flat cells or batteries for portable equipment ([H01M 10/123 and H01M 10/125 take precedence](#))}
- H01M 10/127 {with bipolar electrodes}
- H01M 10/128 . . . {Processes for forming or storing electrodes in the battery container}
- H01M 10/14 . . . Assembling a group of electrodes or separators
- H01M 10/16 . . . Suspending or supporting electrodes or groups of electrodes in the case

- H01M 10/18 . . with bipolar electrodes
- H01M 10/20 . Semi-lead accumulators, i.e. accumulators in which only one electrode contains lead
- H01M 10/22 . . Selection of materials as electrolytes
- H01M 10/24 . Alkaline accumulators
- H01M 10/26 . . Selection of materials as electrolytes
- H01M 10/28 . . Construction or manufacture
- H01M 10/281 . . . {Large cells or batteries with stacks of plate-like electrodes}
- H01M 10/282 {with bipolar electrodes}
- H01M 10/283 . . . {Cells or batteries with two cup-shaped or cylindrical collectors ([H01M 10/281 takes precedence](#))}
- H01M 10/285 {Button cells}
- H01M 10/286 . . . {Cells or batteries with wound or folded electrodes}
- H01M 10/287 . . . {Small-sized flat cells or batteries for portable equipment ([H01M 10/283 and H01M 10/286 take precedence](#))}
- H01M 10/288 . . . {Processes for forming or storing electrodes in the battery container}
- H01M 10/30 . . Nickel accumulators ([H01M 10/34 takes precedence](#))
- H01M 10/32 . . Silver accumulators ([H01M 10/34 takes precedence](#))
- H01M 10/34 . Gastight accumulators
- H01M 10/342 . . {Gastight lead accumulators ([H01M 10/121 takes precedence](#))}
- H01M 10/345 . . {Gastight metal hydride accumulators}
- H01M 10/347 . . . {with solid electrolyte}
- H01M 10/36 . Accumulators not provided for in groups [H01M 10/05-H01M 10/34](#)
- H01M 10/365 . . {Zinc-halogen accumulators}
- H01M 10/38 . . Construction or manufacture
- H01M 10/39 . . Working at high temperature
- H01M 10/3909 . . . {Sodium-sulfur cells}
- H01M 10/3918 {characterised by the electrolyte}
- H01M 10/3927 {Several layers of electrolyte or coatings containing electrolyte}
- H01M 10/3936 {Electrolyte with a shape other than plane or cylindrical}
- H01M 10/3945 {containing additives or special arrangements in the sodium compartment}
- H01M 10/3954 {containing additives or special arrangement in the sulfur compartment}
- H01M 10/3963 {Sealing means between the solid electrolyte and holders}
- H01M 10/3972 {Flexible parts}
- H01M 10/3981 {Flat cells}
- H01M 10/399 . . . {Cells with molten salts}
- H01M 10/42 . Methods or arrangements for servicing or maintenance of secondary cells or secondary half-cells ([H01M 10/60 takes precedence](#))
- H01M 10/4207 . . {for several batteries or cells simultaneously or sequentially}
- H01M 10/4214 . . {Arrangements for moving electrodes or electrolyte}
- H01M 10/4221 . . {with battery type recognition}
- H01M 10/4228 . . {Leak testing of cells or batteries}

- H01M 10/4235 . . {Safety or regulating additives or arrangements in electrodes, separators or electrolyte ([H01M 10/4242](#) takes precedence)}
- H01M 10/4242 . . {Regeneration of electrolyte or reactants}
- H01M 10/425 . . {Structural combination with electronic components, e.g. electronic circuits integrated to the outside of the casing ([printed circuits H05K 1/00](#))}
- H01M 10/4257 . . . {Smart batteries, e.g. electronic circuits inside the housing of the cells or batteries}
- H01M 10/4264 . . . {with capacitors}
- H01M 2010/4271 . . . {Battery management systems including electronic circuits, e.g. control of current or voltage to keep battery in healthy state, cell balancing}
- H01M 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}
- H01M 10/4285 . . {Testing apparatus}
- H01M 2010/4292 . . {Aspects relating to capacity ratio of electrodes/electrolyte or anode/cathode}
- H01M 10/44 . . Methods for charging or discharging ([circuits for charging H02J 7/00](#))
- H01M 10/441 . . . {for several batteries or cells simultaneously or sequentially}
- H01M 10/443 . . . {in response to temperature}
- H01M 10/445 . . . {in response to gas pressure}
- H01M 10/446 . . . {Initial charging measures}
- H01M 10/448 . . . {End of discharge regulating measures}
- H01M 10/46 . . Accumulators structurally combined with charging apparatus ([circuits for charging H02J 7/00](#))
- H01M 10/465 . . . {with solar battery as charging system}
- H01M 10/48 . . Accumulators combined with arrangements for measuring, testing or indicating condition, e.g. level or density of the electrolyte ([H01M 10/44](#) takes precedence); indicating or measuring level of liquid in general [G01F 23/00](#); measuring density [G01N](#), e.g. [G01N 9/00](#); measuring electric variables [G01R](#))
- H01M 10/482 . . . {for several batteries or cells simultaneously or sequentially}
- H01M 10/484 . . . {for measuring electrolyte level, electrolyte density or electrolyte conductivity}
- H01M 10/486 . . . {for measuring temperature}
- H01M 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}
- H01M 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](#))
- H01M 10/523 . . . {by recombination on a catalytic material}
- H01M 10/526 . . . {by gas recombination on the electrode surface or by structuring the electrode surface to improve gas recombination}
- H01M 10/54 . . Reclaiming serviceable parts of waste accumulators
- H01M 10/60 . . Heating or cooling; Temperature control
- H01M 10/61 . . Types of temperature control
- H01M 10/613 . . . Cooling or keeping cold
- H01M 10/615 . . . Heating or keeping warm
- H01M 10/617 . . . for achieving uniformity or desired distribution of temperature

- H01M 10/62 . . specially adapted for specific applications
- H01M 10/623 . . . Portable devices, e.g. mobile telephones, cameras or pacemakers
- H01M 10/6235 Power tools
- H01M 10/625 . . . Vehicles
- H01M 10/627 . . . Stationary installations, e.g. power plant buffering or backup power supplies
- H01M 10/63 . . Control systems ([measurement of temperature H01M 10/486](#); [charging or discharging in response to temperature H01M 10/443](#))
- H01M 10/633 . . . characterised by algorithms, flow charts, software details or the like
- H01M 10/635 . . . based on ambient temperature
- H01M 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](#))
- H01M 10/64 . . characterised by the shape of the cells
- H01M 10/643 . . . Cylindrical cells
- H01M 10/647 . . . Prismatic or flat cells, e.g. pouch cells
- H01M 10/65 . . Means for temperature control structurally associated with the cells
- H01M 10/651 . . . characterised by parameters specified by a numeric value or mathematical formula, e.g. ratios, sizes or concentrations
- H01M 10/652 characterised by gradients ([for achieving a desired temperature gradient H01M 10/617](#))
- H01M 10/653 . . . characterised by electrically insulating or thermally conductive materials
- H01M 10/654 . . . located inside the innermost case of the cells, e.g. mandrels, electrodes or electrolytes
- H01M 10/655 . . . Solid structures for heat exchange or heat conduction
- H01M 10/6551 Surfaces specially adapted for heat dissipation or radiation, e.g. fins or coatings
- H01M 10/6552 Closed pipes transferring heat by thermal conductivity or phase transition, e.g. heat pipes
- H01M 10/6553 Terminals or leads
- H01M 10/6554 Rods or plates
- H01M 10/6555 arranged between the cells
- H01M 10/6556 Solid parts with flow channel passages or pipes for heat exchange ([closed pipes H01M 10/6552](#))
- H01M 10/6557 arranged between the cells
- H01M 10/656 . . . characterised by the type of heat-exchange fluid
- H01M 10/6561 Gases
- H01M 10/6562 with free flow by convection only
- H01M 10/6563 with forced flow, e.g. by blowers
- H01M 10/6564 using compressed gas
- H01M 10/6565 with recirculation or U-turn in the flow path, i.e. back and forth
- H01M 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](#))
- H01M 10/6567 Liquids

- H01M 10/6568 characterised by flow circuits, e.g. loops, located externally to the cells or cell casings
- H01M 10/6569 Fluids undergoing a liquid-gas phase change or transition, e.g. evaporation or condensation ([heat pipes H01M 10/6552](#))
- H01M 10/657 . . . by electric or electromagnetic means
- H01M 10/6571 Resistive heaters ([arrangements for heating the battery by its resistance to the internal current H01M 10/637](#))
- H01M 10/6572 Peltier elements or thermoelectric devices
- H01M 10/658 . . . by thermal insulation or shielding
- H01M 10/659 . . . by heat storage or buffering, e.g. heat capacity or liquid-solid phase changes or transition
- H01M 10/6595 . . . by chemical reactions other than electrochemical reactions of the cells, e.g. catalytic heaters or burners
- H01M 10/66 . . Heat-exchange relationships between the cells and other systems, e.g. central heating systems or fuel cells
- H01M 10/663 . . . the system being an air-conditioner or an engine
- H01M 10/667 . . . the system being an electronic component, e.g. a CPU, an inverter or a capacitor

H01M 12/00 Hybrid cells; Manufacture thereof

NOTE

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.

- H01M 12/005 . {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](#))}
- H01M 12/02 . Details ([of non-active parts H01M 2/00](#); [of electrodes H01M 4/00](#))
- H01M 12/04 . composed of a half-cell of the fuel-cell type and of a half-cell of the primary-cell type ([methods or arrangements for servicing or maintenance H01M 6/50](#))
- H01M 12/06 . . with one metallic and one gaseous electrode
- H01M 12/065 . . . {[with plate-like electrodes or stacks of plate-like electrodes](#)}
- H01M 12/08 . composed of a half-cell of a fuel-cell type and a half-cell of the secondary-cell type ([methods or arrangements for servicing or maintenance, e.g. for charging, H01M 10/42](#))
- H01M 12/085 . . {[Zinc-halogen cells or batteries](#)}

H01M 14/00 Electrochemical current or voltage generators not provided for in groups H01M 6/00 - H01M 12/00; Manufacture thereof

- H01M 14/005 . {[Photoelectrochemical storage cells](#) ([light sensitive devices H01G 9/20](#), [semiconductors sensitive to light H01L 31/00](#))}

H01M 16/00 Structural combinations of different types of electrochemical generators

- H01M 16/003 . {[of fuel cells with other electrochemical devices, e.g. capacitors, electrolyzers](#)}
- H01M 16/006 . . {[of fuel cells with rechargeable batteries](#)}

H01M 2200/00**Safety devices for primary or secondary batteries**

- H01M 2200/10 . Temperature sensitive devices
- H01M 2200/101 . . Bimetal
- H01M 2200/103 . . Fuse
- H01M 2200/105 . . NTC
- H01M 2200/106 . . PTC
- H01M 2200/108 . . Normal resistors
- H01M 2200/20 . Pressure-sensitive devices
- H01M 2200/30 . Preventing polarity reversal

H01M 2220/00**Batteries for particular applications**

- H01M 2220/10 . Batteries in stationary systems, e.g. emergency power source in plant
- H01M 2220/20 . Batteries in motive systems, e.g. vehicle, ship, plane
- H01M 2220/30 . Batteries in portable systems, e.g. mobile phone, laptop

H01M 2250/00**Fuel cells for particular applications; Specific features of fuel cell system**

- H01M 2250/10 . Fuel cells in stationary systems, e.g. emergency power source in plant
- H01M 2250/20 . Fuel cells in motive systems, e.g. vehicle, ship, plane
- H01M 2250/30 . Fuel cells in portable systems, e.g. mobile phone, laptop
- H01M 2250/40 . Combination of fuel cells with other energy production systems
- H01M 2250/402 . . Combination of fuel cell with other electric generators ([combination of fuel cells with other electrochemical generator H01M 16/003](#))
- H01M 2250/405 . . Cogeneration of heat or hot water
- H01M 2250/407 . . Combination of fuel cells with mechanical energy generators

H01M 2300/00**Electrolytes**

- H01M 2300/0002 . Aqueous electrolytes
- H01M 2300/0005 . . Acid electrolytes
- H01M 2300/0008 . . . Phosphoric acid-based
- H01M 2300/0011 . . . Sulfuric acid-based
- H01M 2300/0014 . . Alkaline electrolytes
- H01M 2300/0017 . Non-aqueous electrolytes
- H01M 2300/002 . . Inorganic electrolyte
- H01M 2300/0022 . . . Room temperature molten salts
- H01M 2300/0025 . . Organic electrolyte
- H01M 2300/0028 . . . characterised by the solvent
- H01M 2300/0031 Chlorinated solvents
- H01M 2300/0034 Fluorinated solvents
- H01M 2300/0037 Mixture of solvents
- H01M 2300/004 Three solvents
- H01M 2300/0042 Four or more solvents

- H01M 2300/0045 . . . Room temperature molten salts comprising at least one organic ion
- H01M 2300/0048 . . Molten electrolytes used at high temperature
- H01M 2300/0051 . . . Carbonates
- H01M 2300/0054 . . . Halogenides
- H01M 2300/0057 Chlorides
- H01M 2300/006 . . . Hydroxides
- H01M 2300/0062 . . . Nitrates
- H01M 2300/0065 . . Solid electrolytes
- H01M 2300/0068 . . . inorganic
- H01M 2300/0071 Oxides
- H01M 2300/0074 Ion conductive at high temperature
- H01M 2300/0077 based on zirconium oxide
- H01M 2300/008 Halides
- H01M 2300/0082 . . . Organic polymers
- H01M 2300/0085 . Immobilising or gelification of electrolyte
- H01M 2300/0088 . Composites
- H01M 2300/0091 . . in the form of mixtures
- H01M 2300/0094 . . in the form of layered products, e.g. coatings
- H01M 2300/0097 . . . with adhesive layers