

ECLA EUROPEAN 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. [H01L31/00](#), [H01L35/00](#), [H01L37/00](#))

Note

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

H01M2/00

Constructional details or processes of manufacture of the non-active parts

- H01M2/02 . Cases, jackets or wrappings (working of plastics or substances in plastic state B29)
- H01M2/02B . . [N: for small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment ([H01M2/02D](#) takes precedence)] [C9602]
- H01M2/02B4 . . . [N: Flat-shaped cells or batteries of flat cells ([H01M2/02B7B](#) takes precedence)]
- H01M2/02B4B [N: with both terminals passing through the case or cover]
- H01M2/02B4C [N: with plate-like or sheet-like terminals ([H01M2/02B4D](#) takes precedence)]
- H01M2/02B4D [N: with window-shaped terminals]
- H01M2/02B5 . . . [N: Cases of prismatic shape] [N1205]
- H01M2/02B7 . . . [N: Cases of cylindrical or round shape] [N1205]
- H01M2/02B7B [N: Button or coin cell cases] [N1205]
- H01M2/02B7D [N: with cup-shaped terminals] [N1205]
- H01M2/02B7D2 [N: with both cup-shaped terminals] [N1205]
- H01M2/02B7D4 [N: with one cup-shaped terminal] [N1205]
- H01M2/02B7D4B [N: with a passing-through terminal ([H01M2/02B7D4D](#) takes precedence)] [N1205]
- H01M2/02B7D4D [N: with a collector centrally disposed in the active mass, e.g. Leclanch cells] [N1205]
- H01M2/02C . . [N: for large-sized cells or batteries, e.g. L.I.S. batteries, traction or motive power type or standby power batteries ([H01M2/02D](#) takes precedence)]
- H01M2/02C2 . . . [N: Details]
- H01M2/02C4 . . . [N: Monobloc manufactured cases comprising multiple compartments]
- H01M2/02C6 . . . [N: Assembly of different cases, i.e. modular battery or cases particularly provided with means for assembling]
- H01M2/02C6B [N: sealed to each other in a non-detachable manner]
- H01M2/02D . . [N: for cells or batteries working under specific conditions such as high temperature, gas diffusion, external electrolyte circulation, external supply of reactants]
- H01M2/02D2 . . . [N: High- temperature cells or batteries, e.g. Na-S cells, Li-Cl₂ cells]
- H01M2/02D4 . . . [N: Hybrid cells or batteries ([H01M2/02B7B](#) takes precedence)]
- H01M2/02E . . [N: characterised by the material]
- H01M2/02E2 . . . [N: for small-sized cells or batteries, batteries or cells for portable equipment]

				N1205]
H01M2/02E4	.	.	.	[N: for large-sized cells or batteries, batteries or cells for traction or motive power or standby power] [N1205]
H01M2/02E6	.	.	.	[N: for high-temperature cells]
H01M2/02E8	.	.	.	[N: of wrappings, outside coatings, jackets around completely closed cell elements] [N1205]
H01M2/02E10	.	.	.	[N: Casing material forming terminal of the cell] [N1205]
H01M2/02E10B	.	.	.	[N: characterized by the internal coating or internal conductive layer] [N1205]
H01M2/02E12	.	.	.	[N: of flexible envelopes or bags around open cell elements] [N1205]
H01M2/02E14	.	.	.	[N: Insulating material (H01M2/02E18B takes precedence)] [N1205]
H01M2/02E14B	.	.	.	[N: being one layer] [N1205]
H01M2/02E14B2	.	.	.	[N: having particulate or reinforced material] [N1205]
H01M2/02E16	.	.	.	[N: Conductive material] [N1205]
H01M2/02E18	.	.	.	[N: comprising layers] [N1205]
H01M2/02E18B	.	.	.	[N: consisting only of insulating material] [N1205]
H01M2/02E18D	.	.	.	[N: characterised by the external coating on the casing] [N1205]
H01M2/02E20	.	.	.	[N: Composite material consisting of mixed or dispersed phases] [N1205]
H01M2/04	.	.		Lids or covers
H01M2/04B	.	.	.	[N: for small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment (H01M2/04D takes precedence)] [C9602]
H01M2/04B2	.	.	.	[N: Crimp-sealed cells or batteries; Cells or batteries with turned-over edges]
H01M2/04B2B	.	.	.	[N: provided with an intermediary sealing member between the crimped or curled edges (H01M2/04B2C takes precedence)]
H01M2/04B2C	.	.	.	[N: comprising an insulating cover provided with an axial bore for receiving a central current collector]
H01M2/04B2C2	.	.	.	[N: with an external conductive cover]
H01M2/04B4	.	.	.	[N: with a metallic cover of which the borders are soldered or welded with the case]
H01M2/04C	.	.	.	[N: for large-sized cells or batteries, e.g. LIS batteries, traction or motive power type or standby power batteries (H01M2/04D takes precedence)] [C9602]
H01M2/04C2	.	.	.	[N: Methods for assembling case and cover]
H01M2/04C2B	.	.	.	[N: without provisions for disassembling]
H01M2/04D	.	.	.	[N: for cells or batteries working under specific conditions such as high temperature, gas diffusion, external electrolyte circulation, external supply of reactants]
H01M2/04D2	.	.	.	[N: High-temperature cells or batteries]
H01M2/04D4	.	.	.	[N: Hybrid cells or batteries]
H01M2/04E	.	.	.	[N: characterised by the shape] [N1206]
H01M2/04E2	.	.	.	[N: Disk-like lids for cylindrical batteries] [N1206]
H01M2/04E2B	.	.	.	[N: Button cell lids] [N1206]
H01M2/04E4	.	.	.	[N: Lids for flat or sheet-like batteries] [N1206]
H01M2/04E6	.	.	.	[N: Lids for prismatic cells] [N1206]
H01M2/04M	.	.	.	[N: characterised by the material] [N1206]
H01M2/04M2	.	.	.	[N: Insulating materials] [N1206]

- H01M2/04M3 [N: Conducting materials] [N1206]
- H01M2/04M4 [N: characterised by the coating] [N1206]
- H01M2/04M4C [N: Conductive coating material] [N1206]
- H01M2/06 . . Arrangements for introducing electric connectors into or through cases
- H01M2/06B . . . [N: using glass or ceramic sealing material]
- H01M2/08 . . Sealing materials

- H01M2/10 . Mountings; Suspension devices; Shock absorbers; Transport or carrying devices; Holders (structural combination of accumulators with charging apparatus [H01M10/46](#))
- H01M2/10B . . [N: Carrying devices]
- H01M2/10B2 . . . [N: using the terminals or connecting links]
- H01M2/10C . . [N: Cabinets, cases, fixing devices, adapters, racks or battery packs] [N1205]
- H01M2/10C2 . . . [N: for miniature batteries or batteries for portable equipment (batteries in portable systems T01M220/30)] [N1205]
- H01M2/10C2A [N: with the possibility of incorporating batteries of different sizes] [N1206]
- H01M2/10C2A2 [N: providing adapters around the batteries] [N1206]
- H01M2/10C2B [N: for button cells]
- H01M2/10C2B2 [N: forming a whole with or incorporated in or fixed to the electronic appliance]
- H01M2/10C2C [N: for cells of cylindrical configuration]
- H01M2/10C2C2 [N: forming a whole with or incorporated in or fixed to the electronic appliance]
- H01M2/10C2D [N: for cells of prismatic configuration or for sheet-like batteries]
- H01M2/10C2D2 [N: forming a whole with or incorporated in or fixed to the electronic appliance]
- H01M2/10C4 . . . [N: for starting, lighting or ignition batteries; Vehicle traction batteries; Stationary or load leading batteries (batteries in stationary systems T01M220/10, batteries in motive systems T01M220/20)] [N1205]
- H01M2/10C4B [N: Racks, groups of several batteries ([H01M2/10C4D](#) takes precedence)]
- H01M2/10C4C [N: Fixing on vehicles]
- H01M2/10C4D [N: for accumulators working at high temperature]
- H01M2/10F . . [N: Particular characteristics of materials used to isolate the battery from its environment, e.g. thermal insulation, corrosion resistance, pressure resistance, electrolyte leakage]

- H01M2/12 . Vent plugs or other mechanical arrangements for facilitating escape of gases
- H01M2/12B . . [N: Vent arrangements incorporated in vent plugs or multiplug systems detachable from the battery or cell]
- H01M2/12B2 . . . [N: Multiplug systems or arrangements; Plurality of plugs surrounded by a common cover] [N9411]
- H01M2/12B2C [N: in the shape of a one-piece member] [N9411]
- H01M2/12C . . [N: Vent arrangements of resealable design ([H01M2/12B](#), [H01M2/12E-H01M2/12W](#) take precedence)]
- H01M2/12C2 . . . [N: comprising a deformable, elastic or flexible valve member]
- H01M2/12D . . [N: Emergency or safety arrangements of non-resealable design ([H01M2/12B](#), [H01M2/12E-H01M2/12W](#) take precedence)]
- H01M2/12D2 . . . [N: in the form of rupturable membranes or weakened parts, e.g. pierced with

- the aid of a sharp member]
- H01M2/12E . . [N: Explosion- or splash-preventing means contained in the head space of the battery, e.g. means floating on the electrolyte]
- H01M2/12F . . [N: comprising elongated, tortuous or labyrinth-shaped exhaust passages in the battery cover or case; Double cover vent systems]
- H01M2/12N . . [N: containing electrolyte neutralising or absorbing means] [N1206]
- H01M2/12P . . [N: comprising gas-pervious parts or elements] [N1206]
- H01M2/12P2 . . . [N: as flame arrester or ignition preventing means] [N1206]
- H01M2/12S . . [N: Spring-loaded vent valves] [N1206]
- H01M2/12T . . [N: Thermally responsive or sensitive vent means] [N1206]
- H01M2/12V . . [N: Film- or sheet-like elastic valve members optionally coated with non-drying glue] [N1206]
- H01M2/12W . . [N: Slit, perforated or punctured elastic valve members] [N1206]

- H01M2/14 . Separators; Membranes; Diaphragms; Spacing elements
- H01M2/14M . . [N: Manufacturing processes] [N1206]
- H01M2/16 . . characterised by the material
- H01M2/16B . . . [N: comprising fibrous material]
- H01M2/16B1 [N: Inorganic fibrous material]
- H01M2/16B3 [N: Organic fibrous material]
- H01M2/16B3B [N: Natural fibres, e.g. cotton, cellulose]
- H01M2/16B5 [N: Mixtures of inorganic and organic fibres]
- H01M2/16C [N: comprising non-fibrous material ([H01M2/16B](#) takes precedence)]
- H01M2/16C1 [N: Inorganic non-fibrous material]
- H01M2/16C3 [N: Organic non-fibrous material]
- H01M2/16C5 [N: Mixtures of inorganic and organic non-fibrous material] [N0307]
- H01M2/16D [N: comprising a non-fibrous layer and a fibrous layer superimposed on one another]
- H01M2/16E [N: Electrode-separator combination]
- H01M2/16E1 [N: with adhesive layers between electrodes and separators] [N1206]
- H01M2/16L [N: Separators having two or more layers of either fibrous or non-fibrous materials] [N1206]
- H01M2/16W [N: Wood]
- H01M2/18 . . characterised by the shape
- H01M2/18M [N: Separators made of one single microscopic fiber] [N1206]

- H01M2/20 . Current conducting connections for cells
- H01M2/20D . . [N: Interconnectors for or interconnection of the terminals of adjacent or distinct batteries or cells] [N9602]
- H01M2/20D2 [N: of small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment] [N9602]
- H01M2/20D4 [N: of large-sized cells or batteries, e.g. L.I.S. batteries, traction or motive power type or standby power batteries] [N9602]
- H01M2/20D6 [N: for cells or batteries working under specific conditions such as high temperature, gas diffusion, external electrolyte circulation, external supply of reactants] [N9602]

- H01M2/22 . . Fixed connections, i.e. not intended for disconnection
- H01M2/24 . . . Intercell connections through partitions, e.g. in a battery case
- H01M2/26 . . . Electrode connections
- H01M2/26C [N: Electrode connections overlying wounded or folded electrode stacks] [N9503]
- H01M2/26D [N: Interconnections of several platelike electrodes in parallel, e.g. electrode pole straps or bridges] [N9503]
- H01M2/28 for lead-acid accumulators
- H01M2/30 . . Terminals
- H01M2/30B . . . [N: Terminal post members on carbon electrodes; Machines or processes for applying said terminal post members, e.g. capping of carbon rods]
- H01M2/30C . . . [N: Poles or terminals for L.I.S, traction or motive power type or standby power batteries] [N9503]
- H01M2/30C2 [N: the poles being connected and passing through hollow metallic terminals, e.g. terminal bushings] [N9503]
- H01M2/32 . . Methods or arrangements for affording protection against corrosion; Selection of materials therefor
- H01M2/34 . . with provision for preventing undesired use or discharge, [N: e.g. complete cut of current (safety devices T01M200/00)] [N1205]
- H01M2/34A . . . [N: Anti-theft provisions] [N1206]
- H01M2/34F . . . [N: Protection against polarity reversal]
- H01M2/34G . . . [N: Guarantee labels or covers]
- H01M2/34P . . . [N: in response to pressure] [N1206]
- H01M2/34S . . . [N: in response to shock] [N1205]
- H01M2/34T . . . [N: in response to temperature] [N1206]
- H01M2/36 . . arrangements for filling, topping-up or emptying cases with or of liquid, e.g. for filling with electrolytes, for washing-out
- H01M2/36B . . . [N: Filling of small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment] [N9602]
- H01M2/36C . . . [N: 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] [N9602]
- H01M2/36D . . . [N: Removing or drainage of electrolyte; Cleaning battery or cell cases] [N9602]
- H01M2/36F . . . [N: means or methods for closing or sealing the liquid supply hole] [N1205]
- H01M2/36S . . . [N: with means for preventing spilling of liquid or electrolyte , e.g. when the battery is tilted or turned over] [N1205]
- H01M2/36S2 [N: by closing the vent passages with a valve] [N1205]
- H01M2/38 . . Arrangements for moving electrolytes
- H01M2/38G . . . [N: Electrolyte stirring by action of gases on or in the electrolyte] [N1205]
- H01M2/40 . . with external circulating path ([H01M8/04](#) takes precedence)
- H01M4/00** **Electrodes (electrodes for electrolytic processes C25, [N: electrodes for hybrid or electric double capacitor H01G11/22]) [N1205]**
- H01M4/02 . . Electrodes composed of or comprising active material
- H01M4/04 . . Processes of manufacture in general

H01M4/04B	. . .	[N: Methods of deposition of the material] [N0603]
H01M4/04B2	. . . .	[N: by coating on electrode collectors] [N0603]
H01M4/04B6	. . . .	[N: by coating on an electrolyte layer] [N0603]
H01M4/04B8	. . . .	[N: by a doctor blade method, slip-casting or roller coating] [N1205]
H01M4/04B10	. . . .	[N: by extrusion] [N1205]
H01M4/04B12	. . . .	[N: by screen printing] [N1205]
H01M4/04B14	. . . .	[N: involving impregnation with a solution, dispersion, paste or dry powder (H01M4/04E takes precedence)] [N1205]
H01M4/04B16	. . . .	[N: involving spraying] [N1205]
H01M4/04B18	. . . .	[N: involving vapour deposition] [N1205]
H01M4/04B18B	. . . . .	[N: Physical vapour deposition] [N1205]
H01M4/04B18B2	. . . . .	[N: Sputtering] [N1205]
H01M4/04B18D	. . . . .	[N: Chemical vapour deposition] [N1205]
H01M4/04C	. . .	[N: involving compressing or compaction] [N0603]
H01M4/04C2	. . . .	[N: Molding] [N0603]
H01M4/04C4	. . . .	[N: Rolling or calendering] [N0603]
H01M4/04E	. . .	[N: by electrochemical processing (electroless electrochemical plating C23C18/54)] [N1205]
H01M4/04E2	. . . .	[N: Activating, forming or electrochemical attack of the supporting material] [N1205]
H01M4/04E2A	. . . . .	[N: Anodisation, Oxidation (electrolytic coating by anodisation C25D9/00)] [N1205]
H01M4/04E2C	. . . . .	[N: Forming after manufacture of the electrode, e.g. first charge, cycling] [N1205]
H01M4/04E2C2	. . . . .	[N: of complete cells or cells stacks] [N1205]
H01M4/04E4	. . . .	[N: Electrochemical coating; Electrochemical impregnation] [N1205]
H01M4/04E4A	. . . . .	[N: from solutions] [N1205]
H01M4/04E4B	. . . . .	[N: from melts] [N1205]
H01M4/04E4C	. . . . .	[N: from dispersions or suspensions; Electrophoresis] [N1205]
H01M4/04E6	. . . .	[N: Electrochemical doping, intercalation, occlusion or alloying] [N1205]
H01M4/04E6A	. . . . .	[N: Electrochemical alloying] [N1205]
H01M4/04E8	. . . .	[N: Electro organic synthesis] [N1205]
H01M4/04E8M	. . . . .	[N: Electrochemical polymerisation] [N1205]
H01M4/04E10	. . . .	[N: Electroforming a self-supporting electrode; Electroforming of powdered electrode material] [N1205]
H01M4/04F	. . .	[N: involving thermal treatment, e.g. firing, sintering, backing particulate active material, thermal decomposition, pyrolysis] [N1205]
H01M4/04G	. . .	[N: Filling tube-or pockets type electrodes; Applying active mass in cup-shaped terminals] [N9602]
H01M4/04G3	. . . .	[N: with molten material] [N1205]
H01M4/04G4	. . . .	[N: with dispersions, suspensions or pastes] [N1205]
H01M4/04G5	. . . .	[N: with dry powder] [N1205]
H01M4/04M	. . .	[N: by methods including the handling of a melt (H01M4/04E, take precedence)] [N0604]
H01M4/04M2	. . . .	[N: Casting] [N0603]

- H01M4/04M4 [N: Alloying] [N0603]
 - H01M4/04N [N: Manufacturing of an active layer by chemical means] [N0603]
 - H01M4/04N2 [N: Chemical attack of the support material] [N0603]
 - H01M4/04N4 [N: Chemical alloying] [N0603]
 - H01M4/04N6 [N: Chemical precipitation] [N0603]
 - H01M4/06 . . Electrodes for primary cells
 - H01M4/08 Processes of manufacture
 - H01M4/10 of pressed electrodes with central core, i.e. dollies
 - H01M4/12 of consumable metal or alloy electrodes (use of alloy compositions as active materials [H01M4/38](#))
 - H01M4/13 . . Electrodes for accumulators with non-aqueous electrolyte, e.g. for lithium-accumulators; Processes of manufacture thereof [N0706]
- [N: **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 [H01M10/39](#)
]
- H01M4/131 Electrodes based on mixed oxides or hydroxides, or on mixtures of oxides or hydroxides, e.g. LiCoOx [N0706]
 - H01M4/1315 containing halogen atoms, e.g. LiCoOxFy [N0706]
 - H01M4/133 Electrodes based on carbonaceous material, e.g. graphite-intercalation compounds or CFx [N0706]
 - H01M4/134 Electrodes based on metals, Si or alloys [N0706]
 - H01M4/136 Electrodes based on inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoFy [N0706]
 - H01M4/137 Electrodes based on electro-active polymers [N0706]
 - H01M4/139 Processes of manufacture [N0706]
 - H01M4/1391 of electrodes based on mixed oxides or hydroxides, or on mixtures of oxides or hydroxides, e.g. LiCoOx [N0706]
 - H01M4/13915 containing halogen atoms, e.g. LiCoOxFy [N0706]
 - H01M4/1393 of electrodes based on carbonaceous material, e.g. graphite-intercalation compounds or CFx [N0706]
 - H01M4/1395 of electrodes based on metals, Si or alloys [N0706]
 - H01M4/1397 of electrodes based on inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoFy [N0706]
 - H01M4/1399 of electrodes based on electro-active polymers [N0706]
 - H01M4/14 . . Electrodes for lead-acid accumulators
 - H01M4/16 Processes of manufacture
 - H01M4/18 of Plantè electrodes
 - H01M4/20 of pasted electrodes
 - H01M4/21 Drying of pasted electrodes
 - H01M4/22 Forming of electrodes
 - H01M4/23 Drying or preserving electrodes after forming
 - H01M4/24 . . Electrodes for alkaline accumulators

H01M4/24B	. . .	[N: Hydrogen storage electrodes] [N9501]
H01M4/24C	. . .	[N: Zinc electrodes] [N9501]
H01M4/24D	. . .	[N: Cadmium electrodes] [N9602]
H01M4/24F	. . .	[N: Iron electrodes] [N9602]
H01M4/26	. . .	Processes of manufacture
H01M4/28	. . . .	Precipitating active material on the carrier
H01M4/29	. . . . .	by electrochemical methods
H01M4/30	. . . .	Pressing
H01M4/32	. . .	Nickel oxide or hydroxide electrodes
H01M4/34	. . .	Silver oxide or hydroxide electrodes
H01M4/36	. .	Selection of substances as active materials, active masses, active liquids [N: (electrode materials of hybrid or double layer capacitors H01G11/30-H01G11/50) [C1207]
H01M4/36K	. . .	[N: Composites] [N1206]
H01M4/36K1	. . . .	[N: as mixtures] [N1206]
H01M4/36K2	. . . .	[N: as layered products] [N1206]
H01M4/36L	. . .	[N: Liquid depolarisers] [N1206]
H01M4/38	. . .	of elements or alloys
H01M4/38A	. . . .	[N: Alkaline or alkaline earth metals elements (H01M4/40 takes precedence)] [N1205]
H01M4/38A3	. . . . .	[N: Lithium (H01M4/40B takes precedence)] [N1205]
H01M4/38B	. . . .	[N: Hydrogen absorbing alloys]
H01M4/38B2	. . . . .	[N: of the type LaNi ₅] [N1205]
H01M4/38D	. . . .	[N: Silicon or alloys based on silicon] [N1205]
H01M4/38F	. . . .	[N: Tin or alloys based on tin] [N1205]
H01M4/38H	. . . .	[N: Halogens] [N1205]
H01M4/40	. . . .	Alloys based on alkali metals
H01M4/40B	. . . . .	[N: Alloys based on lithium] [N1205]
H01M4/42	. . . .	Alloys based on zinc
H01M4/44	. . . .	Alloys based on cadmium
H01M4/46	. . . .	Alloys based on magnesium or aluminium
H01M4/46A	. . . . .	[N: Aluminium based] [N1206]
H01M4/46M	. . . . .	[N: Magnesium based] [N1206]
H01M4/48	. . .	of inorganic oxides or hydroxides
H01M4/48A	. . . .	[N: of mercury] [N1206]
H01M4/48B	. . . .	[N: for non-aqueous cells (H01M4/485 takes precedence)] [C0706]
H01M4/485	. . . .	of mixed oxides or hydroxides for inserting or intercalating light metals, e.g. LiTi ₂ O ₄ or LiTi ₂ O _x F _y (H01M4/505 , H01M4/525 take precedence) [N0706]
H01M4/50	. . . .	of manganese
H01M4/50B	. . . . .	[N: for non-aqueous cells (H01M4/505 takes precedence)] [C0706]
H01M4/505	. . . . .	of mixed oxides or hydroxides containing manganese for inserting or intercalating light metals, e.g. LiMn ₂ O ₄ or LiMn ₂ O _x F _y [N0706]
H01M4/52	. . . .	of nickel, cobalt or iron
H01M4/52A	. . . . .	[N: of iron for aqueous cells]

H01M4/52B	. . . . .	[N: for non-aqueous cells (H01M4/525 takes precedence)] [C0706]
H01M4/525	. . . . .	of mixed oxides or hydroxides containing iron, cobalt or nickel for inserting or intercalating light metals, e.g. LiNiO ₂ , LiCoO ₂ or LiCoO _x F _y [N0706]
H01M4/54	. . . . .	of silver
H01M4/56	. . . . .	of lead
H01M4/57	. . . . .	of "Grey lead", i.e. powders containing lead and lead oxide
H01M4/58	. . . . .	of inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoF _y [C0706]
H01M4/58A	. . . . .	[N: Phosphides] [N1205]
H01M4/58B	. . . . .	[N: Chalcogenides or intercalation compounds thereof]
H01M4/58B2	. . . . .	[N: Sulfides] [N1205]
H01M4/58C	. . . . .	[N: Halogenides]
H01M4/58D	. . . . .	[N: Oxygenated metallic slats or polyanionic structures, e.g. borates, phosphates, silicates, olivines] [C1207]
		[N: Note [N1207] Polyanionic structures comprises elements not changing oxidation state during electrochemical reaction, e.g. P, Si, B]
H01M4/583	. . . . .	Carbonaceous material, e.g. graphite-intercalation compounds or CF _x [N0706]
H01M4/583B	. . . . .	[N: Comprising fluorine or fluoride salts] [N1205]
H01M4/587	. . . . .	for inserting or intercalating light metals [N0706]
H01M4/60	. . . . .	of organic compounds
H01M4/60M	. . . . .	[N: Polymers] [N1205]
H01M4/60M2	. . . . .	[N: containing aliphatic main chain polymers] [N1205]
H01M4/60M4	. . . . .	[N: containing aromatic main chain polymers] [N1205]
H01M4/60M4B	. . . . .	[N: containing heterocyclic rings] [N1205]
H01M4/62	. . . . .	Selection of inactive substances as ingredients for active masses, e.g. binders, fillers
H01M4/62B	. . . . .	[N: Binders]
H01M4/62B2	. . . . .	[N: being polymers] [N1205]
H01M4/62B2F	. . . . .	[N: fluorinated polymers] [N1205]
H01M4/62C	. . . . .	[N: Electric conductive fillers] [C9409]
H01M4/62C2	. . . . .	[N: Carbon or graphite]
H01M4/62C4	. . . . .	[N: Metals] [N1205]
H01M4/62D	. . . . .	[N: Expanders for lead-acid accumulators]
H01M4/62G	. . . . .	[N: Inhibitors, e.g. gassing inhibitors, corrosion inhibitors] [N1206]
H01M4/64	. . . . .	Carriers or collectors [N: (current collector for hybrid or electric double layer capacitors H01G11/66)] [N1205]
H01M4/66	. . . . .	Selection of materials
H01M4/66A	. . . . .	[N: Metal or alloys, e.g. alloy coatings (H01M4/66S take precedence)] [N1205]
H01M4/66A2	. . . . .	[N: Alloys (collectors of lead alloys H01M4/68B)] [N1205]
H01M4/66C	. . . . .	[N: containing carbon or carbonaceous materials as conductive part, e.g.

		graphite, carbon fibres]
H01M4/66D	. . . .	[N: Ceramic materials]
H01M4/66K	. . . .	[N: Composites] [N1205]
H01M4/66K1	. . . . .	[N: in the form of mixed materials (H01M4/66R takes precedence)] [N1205]
H01M4/66K2	. . . . .	[N: in the form of layers, e.g. coatings] [N1205]
H01M4/66R	. . . .	[N: Composites of electroconductive material and synthetic resins]
H01M4/66S	. . . .	[N: Steels]
H01M4/68	. . . .	for use in lead-acid accumulators
H01M4/68B	. . . . .	[N: Lead alloys]
H01M4/70	. . . .	characterised by shape or form
H01M4/72	. . . .	Grids
H01M4/73	. . . . .	for lead-acid accumulators, e.g. frame plates
H01M4/74	. . . . .	Meshes or woven material; Expanded metal
H01M4/74A	. . . . .	[N: perforated material] [N1205]
H01M4/74B	. . . . .	[N: Expanded metal]
H01M4/74C	. . . . .	[N: Woven material] [N1205]
H01M4/75	. . . .	Wires, rods or strips
H01M4/76	. . . .	Containers for holding the active material, e.g. tubes, capsules
H01M4/76B	. . . . .	[N: Porous or perforated metallic containers]
H01M4/76C	. . . . .	[N: Tubular type or pencil type electrodes; tubular or multitubular sheaths or covers of insulating material for said tubular-type electrodes]
H01M4/76C2	. . . . .	[N: Multitubular sheaths or covers] [N1205]
H01M4/78	. . . .	Shapes other than plane or cylindrical, e.g. helical
H01M4/80	. . . .	Porous plates, e.g. sintered carriers
H01M4/80B	. . . . .	[N: Sintered carriers] [N1205]
H01M4/80B1	. . . . .	[N: of only powdered material] [N1205]
H01M4/80B2	. . . . .	[N: of powdered and fibrous material] [N1205]
H01M4/80C	. . . . .	[N: Nonwoven fibrous fabric containing only fibres] [N1205]
H01M4/80D	. . . . .	[N: Foamed, spongy materials] [N9901]
H01M4/82	. . . .	Multi-step processes for manufacturing carriers for lead-acid accumulators (single step processes see the relevant subclasses, e.g. B21D ; B22D)
H01M4/84	. . . .	involving casting
H01M4/86	. . . .	Inert electrodes with catalytic activity, e.g. for fuel cells
H01M4/86B	. . . .	[N: Porous electrodes] [N9503]
H01M4/86B2	. . . .	[N: with a gradient in the porosity] [N0603]
H01M4/86B4	. . . .	[N: Bifunctional electrodes for rechargeable cells] [N9503]
H01M4/86B6	. . . .	[N: containing only metallic or ceramic material, e.g. made by sintering or sputtering] [N9503]
H01M4/86B8	. . . .	[N: characterised by the form] [N9503]
H01M4/86B8B	. . . . .	[N: Bipolar electrodes] [N9503]
H01M4/86G	. . . .	[N: with a gradient in another property than porosity (H01M4/86B2 takes precedence)] [N0603]

- H01M4/86G3 . . . [N: Gradient in composition] [N0603]
- H01M4/86K . . . [N: consisting of more than one material, e.g. consisting of composites] [N0603]
- H01M4/86K1 . . . [N: as mixture] [N0603]
- H01M4/86K2 . . . [N: layered] [N0603]
- H01M4/86M . . . [N: Selection of inactive substances as ingredients for catalytic active masses, e.g. binders, fillers] [N1001]
- H01M4/86M2 . . . [N: Binders] [N1001]
- H01M4/86M3 . . . [N: Electrically conductive fillers] [N1001]
- H01M4/88 . . . Processes of manufacture
- H01M4/88B . . . [N: Supports for the deposition of the catalytic active composition ([H01M4/90](#) takes precedence)] [N1001]

[N: WARNING

Groups [H01M4/88B](#) to [H01M4/88K6](#) are not complete, pending a reorganization. See also [H01M4/88](#), [H01M4/88F](#), [H01M8/10B2A](#) and [H01M8/10B2U](#) [N1001]

- H01M4/88B2 [N: Gas diffusion layers] [N1001]
- H01M4/88B4 [N: Electrolytic membranes] [N1001]
- H01M4/88B6 [N: Temporary supports, e.g. decal] [N1001]
- H01M4/88D [N: Treatment of supports before application of the catalytic active composition (coated porous composites [H01M8/02C4K2](#))] [N1001]
- H01M4/88D2 [N: Wet proofing] [N1001]
- H01M4/88G [N: Methods for deposition of the catalytic active composition] [N1001]
- H01M4/88G2 [N: Coating with slurry or ink] [N1001]
- H01M4/88G2B [N: Ink jet printing] [N1001]
- H01M4/88G2D [N: Screen printing] [N1001]
- H01M4/88G2F [N: Painting] [N1001]
- H01M4/88G4 [N: Coating using a catalyst salt precursor in solution followed by evaporation and reduction of the precursor] [N1001]
- H01M4/88G6 [N: Impregnation] [N1001]
- H01M4/88G6B [N: followed by reduction of the catalyst salt precursor] [N1001]
- H01M4/88G8 [N: Electrodeposition] [N1001]
- H01M4/88G10 [N: Casting, e.g. tape casting, vacuum slip casting] [N1001]
- H01M4/88G12 [N: Powder spraying, e.g. wet or dry powder spraying, plasma spraying] [N1001]
- H01M4/88G14 [N: Extrusion] [N1001]
- H01M4/88G16 [N: Vapour deposition] [N1205]
- H01M4/88G16B [N: Sputtering] [N1001]
- H01M4/88H [N: 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] [N1004]
- H01M4/88K [N: Treatment steps after deposition of the catalytic active composition or after shaping of the electrode being free-standing body] [N1001] [C1004]
- H01M4/88K2 [N: Heat treatment, e.g. drying, baking] [N1001]
- H01M4/88K2B [N: Sintering or firing] [N1001]

- H01M4/88K2B2 [N: Cosintering or cofiring of a catalytic active layer with another type of layer] [N1001]
- H01M4/88K4 [N: Impregnation or coating of the catalyst layer, e.g. by an ionomer] [N1001]
- H01M4/88K6 [N: Pressing, rolling, calendaring (membrane electrode assemblies H01M8/10B2)] [N1001]
- H01M4/90 . . . Selection of catalytic material
- H01M4/90B [N: Organic or organo-metallic compounds]
- H01M4/90C [N: Oxides, hydroxides or oxygenated metallic salts]
- H01M4/90C2 [N: Oxides specially used in fuel cell operating at high temperature, e.g. SOFC] [N1205]
- H01M4/90C2B [N: Complex oxides, optionally doped, of the type M1MeO3, M1 being an alkaline earth metal or a rare earth, Me being a metal, e.g. perovskites] [N1205]
- H01M4/90D [N: Metals or alloys (H01M4/92 takes precedence)] [N1205]
- H01M4/90D2 [N: specially used in fuel cell operating at high temperature, e.g. SOFC] [N1205]
- H01M4/90D2B [N: of noble metals or noble-metal based alloys] [N1205]
- H01M4/90D2D [N: of metal-ceramic composites or mixtures, e.g. cermets] [N1205]
- H01M4/90S [N: Catalytic material supported on carriers, e.g. powder carriers (H01M4/88B2, H01M4/88B4, H01M4/88B6, H01M4/92S take precedence)] [N1205]
- H01M4/90S2 [N: on carbon or graphite] [N1205]
- H01M4/90U [N: Unsupported catalytic particles; loose particulate catalytic materials, e.g. in fluidised state] [N1205]
- H01M4/92 Metals of platinum group (H01M4/94, [N: H01M4/90D2B] take precedence) [C1207]
- H01M4/92B [N: Alloys or mixtures with metallic elements] [N9511]
- H01M4/92C [N: Compounds thereof with non-metallic elements] [N9511]
- H01M4/92S [N: supported on carriers, e.g. powder carriers] [N1205]
- H01M4/92S2 [N: on carbon or graphite] [N1205]
- H01M4/92U [N: Unsupported catalytic particles; loose particulate catalytic materials, e.g. in fluidised state] [N1205]
- H01M4/94 . . . Non-porous diffusion electrodes, e.g. palladium membranes, ion exchange membranes
- H01M4/96 . . . Carbon-based electrodes
- H01M4/98 . . . Raney-type electrodes

H01M6/00 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.

- H01M6/00M . . . [N: Devices for making primary cells] [N1205]
- H01M6/02 . . . Details (of non-active parts H01M2/00; of electrodes H01M4/00)
- H01M6/04 . . . Cells with aqueous electrolyte

- H01M6/04E . . [N: characterised by aqueous electrolyte] [N1205]
- H01M6/06 . . Dry cells, i.e. cells wherein the electrolyte is rendered non-fluid
- H01M6/08 . . . with cup shaped electrodes
- H01M6/08B [N: of the reversed type, i.e. anode in the centre] [N1205]
- H01M6/10 . . . with wound or folded electrodes
- H01M6/10B [N: Cells with electrode of only one polarity being folded or wound] [N1205]
- H01M6/12 . . . with flat electrodes

- H01M6/14 . Cells with non-aqueous electrolyte [N: [H01M10/36C](#) takes precedence]
- H01M6/14N . . [N: containing ammonia]
- H01M6/16 . . with organic electrolyte ([H01M6/18](#), [N: [H01M10/40](#) take precedence])
- H01M6/16E . . . [N: characterised by the electrolyte]
- H01M6/16E1 [N: by the solvent (organic electrolyte solvents T01M300/00B4B)] [N1205]
- H01M6/16E3 [N: by the solute]
- H01M6/16E5 [N: by additives]
- H01M6/18 . . with solid electrolyte
- H01M6/18B . . . [N: with polymeric electrolytes (organic polymers electrolytes T01M300/00B8C)] [N1205]
- H01M6/18C . . . [N: with halogenide as solid electrolyte (halide solid electrolytes T01M300/00B8B4)] [N1205]
- H01M6/18C2 [N: with fluoride as solid electrolyte]
- H01M6/18D . . . [N: with oxides, hydroxides or oxysalts as solid electrolytes (oxides solid electrolyte T01M300/00B8B2)] [N1205]
- H01M6/18D2 [N: Only oxysalts-containing solid electrolytes] [N1205]
- H01M6/18F . . . [N: Solid electrolyte characterised by the form (layered solid electrolytes T01M300/00K2)] [N1205]
- H01M6/18P . . . [N: Processes of manufacture]
- H01M6/20 . . . working at high temperature ([deferred-action thermal cells H01M6/36](#))

- H01M6/22 . Immobilising of electrolyte

- H01M6/24 . Cells comprising two different electrolytes

- H01M6/26 . Cells without oxidising active material, e.g. Volta cells

- H01M6/28 . Standard cells, e.g. Weston cells

- H01M6/30 . Deferred-action cells
- H01M6/32 . . activated through external addition of electrolyte or of electrolyte components
- H01M6/34 . . . Immersion cells, e.g. sea-water cells
- H01M6/36 . . containing electrolyte and made operational by physical means, e.g. thermal cells ([thermoelectric solid state devices H01L35/00](#), [H01M37/00](#))
- H01M6/38 . . . by mechanical means
- H01M6/38B [N: by insertion of electrodes] [N1205]

- H01M6/40 . Printed batteries, [N: e.g. thin film batteries] [N1205]

- H01M6/42 . Grouping of primary cells into batteries ([H01M6/40](#) takes precedence)
- H01M6/42B . . [N: Multimode batteries, batteries with "reserve cells"]
- H01M6/44 . . of tubular or cup-shaped cells
- H01M6/46 . . of flat cells
- H01M6/48 . . . with bipolar electrodes
- H01M6/48B [N: Side-by-side bipolar batteries] [N1205]

- H01M6/50 . Methods or arrangements for servicing or maintenance, e.g. maintaining operating temperature [N: (cells or batteries combined with safety devices T01M200/00)] [N1205]
- H01M6/50A . . [N: Auxiliary electrodes] [N1205]
- H01M6/50B . . [N: for several cells simultaneously or successively] [N1205]
- H01M6/50B1 . . . [N: Multimode utilisation] [N1206]
- H01M6/50C . . [N: Arrangements for moving electrodes or separating elements] [N0004]
- H01M6/50D . . [N: Dummy cells] [N1205]
- H01M6/50F . . [N: used as charging means for another battery] [N1205]
- H01M6/50H . . [N: Heating or cooling of cells or batteries]
- H01M6/50I . . [N: Cells or batteries structurally combined with cell condition indicating means ([H01M2/34](#) takes precedence)]
- H01M6/50I2 . . . [N: Cells combined with indicating means for externally visualisation of the condition, e.g. by change of colour or of light intensity] [N1205]
- H01M6/50I4 . . . [N: End of discharge indicated by a voltage step]
- H01M6/50I6 . . . [N: cells combined with sound indicating means] [N1205]
- H01M6/50K . . [N: Type recognition] [N1205]
- H01M6/50P . . [N: Preserving or storing cells] [N1205]
- H01M6/50R . . [N: Regeneration of reactants or electrolyte]
- H01M6/50T . . [N: Testing apparatus]
- H01M6/50U . . [N: Initial activation; predischage; Stabilisation of initial voltage] [N1205]

- H01M6/52 . Reclaiming serviceable parts of waste cells or batteries, [N: e.g. recycling] [N1205]

H01M8/00 Fuel cells; Manufacture thereof

Note

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

- H01M8/00B . [N: Shape, form of a fuel cell] [N1205]
- H01M8/00B2 . . [N: Cylindrical, tubular or wound] [N1205]
- H01M8/00B4 . . [N: Flat] [N1205]

- H01M8/00R . [N: Destruction or recycling of fuel cells] [N0603]

- H01M8/02 . Details
- H01M8/02C . . [N: Collectors, separators, interconnectors, e.g. bipolar separators] [C0605]
- H01M8/02C2 . . . [N: Non-porous and characterised by the material] [C0605]

H01M8/02C2A	. . . .	[N: Metals or alloys] [N9602]
H01M8/02C2A2	. . . . .	[N: Alloys] [N0203]
H01M8/02C2A2F	. . . . .	[N: Alloys based on iron] [N0203]
H01M8/02C2C	. . . . .	[N: Gas-tight carbon-containing material]
H01M8/02C2D	. . . . .	[N: Glass or ceramic materials] [N9602]
H01M8/02C2D2	. . . . .	[N: Complexed oxides, optionally doped, of the type M1MeO3, M1 being an alkaline earth metal or rare earth metal, Me being a metal, e.g. perovskites] [N0203]
H01M8/02C2D2C	. . . . .	[N: Chromium complex oxides] [N0203]
H01M8/02C2F	. . . . .	[N: Polymers or organic resins] [N0603]
H01M8/02C2K	. . . . .	[N: Composites] [N0203]
H01M8/02C2K1	. . . . .	[N: in the form of mixtures] [N0203]
H01M8/02C2K2	. . . . .	[N: in the form of layered products, e.g. coatings] [N0203]
H01M8/02C4	. . . .	[N: Porous and characterised by the material] [N0603]
H01M8/02C4A	. . . . .	[N: Metals or alloys] [N0603]
H01M8/02C4C	. . . . .	[N: Carbonaceous material] [N0603]
H01M8/02C4D	. . . . .	[N: Glass, ceramics or cermets] [N0603]
H01M8/02C4F	. . . . .	[N: Polymers or organic resins] [N0603]
H01M8/02C4K	. . . . .	[N: Composites] [N0603]
H01M8/02C4K1	. . . . .	[N: in the form of mixtures] [N0603]
H01M8/02C4K2	. . . . .	[N: in the form of layered products, e.g. coatings] [N0603]
H01M8/02C6	. . . .	[N: Porous or non porous and characterised by the form (characterised by a channel configuration H01M8/02C8)] [N0603]
H01M8/02C6A	. . . . .	[N: Semicylindrical] [N0603]
H01M8/02C6C	. . . . .	[N: Tubular] [N0603]
H01M8/02C6G	. . . . .	[N: Corrugated or undulate shaped] [N0603]
H01M8/02C6V	. . . . .	[N: Vias, i.e. connector passing through the separator material] [N0603]
H01M8/02C8	. . . .	[N: Porous or non-porous and characterised by a channel configuration, i.e. by the flow field] [N0603]
H01M8/02C8A	. . . . .	[N: Grooves characteristics, pitch, depth] [N0603]
H01M8/02C8M	. . . . .	[N: Meander or serpentine path] [N0603]
H01M8/02C8V	. . . . .	[N: Variable section of reactant channel] [N0603]
H01M8/02C10	. . . .	[N: Heating or cooling facilities in the separators, collectors or interconnectors] [N0603]
H01M8/02C12	. . . .	[N: Separators, collectors or interconnectors including a printed circuit board] [N0603]
H01M8/02D	. . . .	[N: of surrounding electrodes, matrices, membranes or fuel cell elements with sealing or supporting material]
H01M8/02D2	. . . .	[N: in the form of a frame; Frame materials; Way of attaching to frames]
H01M8/02D4	. . . .	[N: Seals characterised by their form] [N0603]
H01M8/02D4R	. . . . .	[N: O-rings] [N0603]
H01M8/02D6	. . . .	[N: Seals characterised by their composition] [N0603]
H01M8/02D6A	. . . . .	[N: Inorganic material] [N0603]
H01M8/02D6F	. . . . .	[N: Organic resins or polymers] [N0603]

- H01M8/02D8 . . . [N: Process of seal formation] [N0603]
- H01M8/02E . . [N: of membranes or electrolyte holding means]
- H01M8/02E2 . . . [N: Matrices; Diaphragms; Membranes]
- H01M8/02E2B [N: for immobilising electrolyte solutions]
- H01M8/02E2C [N: for immobilising electrolyte melts]
- H01M8/02H . . [N: of joining electrodes, reservoir layers, heat exchange units or bipolar separators to each other]

- H01M8/04 . . Auxiliary arrangements or processes, e.g. for control of pressure, for circulation of fluids
- H01M8/04B . . [N: Arrangements or means or processes related to heat exchange or temperature measurements (methods for controlling fuel cells or fuel cell systems [H01M8/04H](#))] [N1205]
- H01M8/04B2 . . . [N: by a gaseous fluid or by combustion of reactants, e.g. bigascooling]
- H01M8/04B2C [N: Heating by combustion] [N0203]
- H01M8/04B4 . . . [N: by a liquid fluid]
- H01M8/04B6 . . . [N: Electrical heating] [N0603]
- H01M8/04B8 . . . [N: Coolant purification] [N0603]
- H01M8/04B10 . . . [N: Storage of heat in the fuel cell system] [N0603]
- H01M8/04B12 . . . [N: Evaporative processes for the cooling of a fuel cell] [N0603]
- H01M8/04B14 . . . [N: Heat exchange or temperature measuring elements, thermal insulation, e.g. heat pipes, heat pumps, fins] [N1205]
- H01M8/04B14B [N: Heat exchange unit structures specially adapted for fuel cell (heat exchanger F28, heat exchangers for fuel cells R28D21/00T120)] [N1205]
- H01M8/04C . . [N: Arrangements or means for reactant regulation. E.g. pressure or concentration] [N1205]
- H01M8/04C2 . . . [N: of gaseous reactants]
- H01M8/04C2B [N: with recycling of the reactants ([H01M8/04C2E](#), [H01M8/04C2C](#) take precedence)]
- H01M8/04C2C [N: Regulation of differential pressures]
- H01M8/04C2D [N: Using a compressor turbine assembly] [N0603]
- H01M8/04C2E [N: with simultaneous supply or evacuation of electrolyte; Humidifying or dehumidifying]
- H01M8/04C2E1 [N: Humidifying] [N0603]
- H01M8/04C2E1A [N: by coolants] [N0603]
- H01M8/04C2E1B [N: by water containing exhaust gases] [N0603]
- H01M8/04C2E1C [N: by diffusion, e.g. making use of membranes] [N0603]
- H01M8/04C2E2 [N: with product water removal]
- H01M8/04C2E2A [N: by condensers, gas-liquid separators or filters] [N1205]
- H01M8/04C2E2B [N: using adsorbents, wicks or hydrophilic material] [N0603]
- H01M8/04C2E2C [N: by purging or increasing flow or pressure of reactants] [N0603]
- H01M8/04C4 . . . [N: of liquid- or electrolyte-charged reactants]
- H01M8/04C4C [N: Concentration measuring cells] [N1205]
- H01M8/04C6 . . . [N: Reactant storage and supply, e.g. means for feeding, pipes] [N0603]
- H01M8/04C6B [N: Cartridges, cryogenic media or cryogenic reservoirs] [N0603]

H01M8/04C6D	. . . .	[N: characterised by the choice for a specific material, e.g. carbon, hydride, absorbent] [N0603]
H01M8/04C8	. . .	[N: Arrangements or means particularly during start-up or shut-down; Depolarisation or activation treatment, e.g. purging; Short-circuiting means for defective fuel cells] [N1205]
H01M8/04C8B	. . . .	[N: Purging of the reactants] [N1205]
H01M8/04C8D	. . . .	[N: Depolarisation] [N1205]
H01M8/04C8F	. . . .	[N: Short circuiting means for defective fuel cells (detection of defective fuel cells H01M8/04H4M, methods for shunting fuel cells H01M8/04H6K6H)] [N1205]
H01M8/04C8H	. . . .	[N: Means for solving freezing problems] [N1205]
H01M8/04C8K	. . . .	[N: Preventing means for fuel crossover] [N1205]
H01M8/04C8M	. . . .	[N: Heating of fuel cells during the start-up of the fuel cells] [N1205]
H01M8/04E	. .	[N: Arrangements or means related to the management of the electrolyte stream, e.g. heat exchange (H01M8/04C2E takes precedence; Treatment of electrolyte residue H01M8/06D)] [N1205]
H01M8/04E2	. . .	[N: Supply means of electrolyte to or in matrix-fuel cells] [N1205]
H01M8/04F	. .	[N: Electrolyte- or water-management of solid electrolyte cells (H01M8/04C2E takes precedence)]
H01M8/04H	. .	[N: Methods for controlling fuel cells or fuel cell systems (means for control H01M8/04B to H01M8/04F)] [C1001]
H01M8/04H2	. . .	[N: Modelling, demonstration models of fuel cells, e.g. for training purposes] [N0603]
H01M8/04H4	. . .	[N: characterised by variables to be detected or calculated, failure or abnormal functionality of the system] [N1001]
H01M8/04H4B	. . . .	[N: Temperature including ambient temperature] [N1205]
H01M8/04H4B2	. . . . .	[N: of anode reactants at the inlet or inside the fuel cell] [N1001]
H01M8/04H4B4	. . . . .	[N: of cathode reactants at the inlet or inside the fuel cell] [N1001]
H01M8/04H4B6	. . . . .	[N: of anode exhausts] [N1001]
H01M8/04H4B8	. . . . .	[N: of cathode exhausts] [N1001]
H01M8/04H4B10	. . . . .	[N: of the coolant] [N1001]
H01M8/04H4B12	. . . . .	[N: of other components of a fuel cell or fuel cell stacks] [N1001]
H01M8/04H4B14	. . . . .	[N: of auxiliary devices, e.g. reformers, compressors, burners] [N1001]
H01M8/04H4D	. . . .	[N: Pressure or flow including ambient pressure] [N1205]
H01M8/04H4D2	. . . . .	[N: of anode reactants at the inlet or inside the fuel cell] [N1001]
H01M8/04H4D4	. . . . .	[N: of cathode reactants at the inlet or inside the fuel cell] [N1001]
H01M8/04H4D6	. . . . .	[N: of anode exhausts] [N1001]
H01M8/04H4D8	. . . . .	[N: of cathode exhausts] [N1001]
H01M8/04H4D10	. . . . .	[N: of the coolant] [N1001]
H01M8/04H4D12	. . . . .	[N: at auxiliary devices, e.g. reformers, compressors, burners] [N1001]
H01M8/04H4D14	. . . . .	[N: Pressure differences, e.g. between anode and cathode] [N1001]
H01M8/04H4F	. . . .	[N: Concentrations or densities] [N1001]
H01M8/04H4F2	. . . . .	[N: of anode reactants at the inlet or inside the fuel cell] [N1001]
H01M8/04H4F4	. . . . .	[N: of cathode reactants at the inlet or inside the fuel cell] [N1001]
H01M8/04H4F6	. . . . .	[N: of anode exhausts] [N1001]

H01M8/04H4F8	. . . . .	[N: of cathode exhausts] [N1001]
H01M8/04H4F10	. . . . .	[N: of the electrolyte] [N1001]
H01M8/04H4F12	. . . . .	[N: of the coolant] [N1001]
H01M8/04H4H	. . . . .	[N: Humidity, moisture or water content including ambient humidity] [N1205]
H01M8/04H4H2	. . . . .	[N: of anode reactants at the inlet or inside the fuel cell] [N1001]
H01M8/04H4H4	. . . . .	[N: of cathode reactants at the inlet or inside the fuel cell] [N1001]
H01M8/04H4H6	. . . . .	[N: of anode exhausts] [N1001]
H01M8/04H4H8	. . . . .	[N: of cathode exhausts] [N1001]
H01M8/04H4H10	. . . . .	[N: of the electrolyte] [N1001]
H01M8/04H4K	. . . . .	[N: Electric variables] [N1001]
H01M8/04H4K2	. . . . .	[N: Voltage] [N1001]
H01M8/04H4K2B	. . . . .	[N: of the individual fuel cell] [N1001]
H01M8/04H4K2D	. . . . .	[N: of fuel cell stacks] [N1001]
H01M8/04H4K2F	. . . . .	[N: of auxiliary devices, e.g. batteries, capacitors] [N1001]
H01M8/04H4K4	. . . . .	[N: Current] [N1001]
H01M8/04H4K4B	. . . . .	[N: of the individual fuel cell] [N1001]
H01M8/04H4K4D	. . . . .	[N: of fuel cell stacks] [N1001]
H01M8/04H4K4F	. . . . .	[N: of auxiliary devices, e.g. batteries, capacitors] [N1001]
H01M8/04H4K6	. . . . .	[N: Power, energy, capacity or load] [N1205]
H01M8/04H4K6B	. . . . .	[N: of the individual fuel cell] [N1001]
H01M8/04H4K6D	. . . . .	[N: of fuel cell stacks] [N1205]
H01M8/04H4K6F	. . . . .	[N: of auxiliary devices, e.g. batteries, capacitors] [N1001]
H01M8/04H4K8	. . . . .	[N: Other electric variables, e.g. resistance or impedance] [N1001]
H01M8/04H4K8B	. . . . .	[N: of the individual fuel cell] [N1001]
H01M8/04H4K8D	. . . . .	[N: of fuel cell stacks] [N1001]
H01M8/04H4K8F	. . . . .	[N: of auxiliary devices, e.g. batteries, capacitors] [N1001]
H01M8/04H4M	. . . . .	[N: Failure or abnormal functionality] [N1001]
H01M8/04H4M2	. . . . .	[N: of the individual fuel cell] [N1001]
H01M8/04H4M4	. . . . .	[N: of fuel cell stacks] [N1001]
H01M8/04H4M6	. . . . .	[N: of auxiliary devices, e.g. batteries, capacitors] [N1001]
H01M8/04H6	. . . . .	[N: characterised by variables to be regulated] [N1001]
H01M8/04H6B	. . . . .	[N: Temperature] [N1001]
H01M8/04H6B2	. . . . .	[N: of fuel cell reactants] [N1001]
H01M8/04H6B4	. . . . .	[N: of fuel cell exhausts] [N1001]
H01M8/04H6B6	. . . . .	[N: of the coolant] [N1001]
H01M8/04H6B8	. . . . .	[N: of other components of a fuel cell or fuel cell stacks] [N1001]
H01M8/04H6B10	. . . . .	[N: of auxiliary devices, e.g. reformer, compressor, burner] [N1001]
H01M8/04H6D	. . . . .	[N: Pressure or flow] [N1001]
H01M8/04H6D2	. . . . .	[N: of fuel cell reactants] [N1001]
H01M8/04H6D4	. . . . .	[N: of fuel cell exhausts] [N1001]
H01M8/04H6D6	. . . . .	[N: of the coolant] [N1001]
H01M8/04H6D8	. . . . .	[N: at auxiliary devices, e.g. reformer, compressor, burner] [N1001]

H01M8/04H6D10	. . . . .	[N: Pressure differences, e.g. between anode and cathode] [N1001]
H01M8/04H6F	. . . . .	[N: Concentrations or densities] [N1001]
H01M8/04H6F2	. . . . .	[N: of fuel cell reactants] [N1001]
H01M8/04H6F4	. . . . .	[N: of fuel cell exhausts] [N1001]
H01M8/04H6F6	. . . . .	[N: of the coolant] [N1001]
H01M8/04H6F8	. . . . .	[N: of the electrolyte] [N1001]
H01M8/04H6H	. . . . .	[N: Humidity, moisture or water content] [N1001]
H01M8/04H6H2	. . . . .	[N: of fuel cell reactants] [N1001]
H01M8/04H6H4	. . . . .	[N: of fuel cell exhausts] [N1001]
H01M8/04H6H6	. . . . .	[N: of the electrolyte] [N1001]
H01M8/04H6K	. . . . .	[N: Electric variables] [N1001]
H01M8/04H6K2	. . . . .	[N: Voltage] [N1001]
H01M8/04H6K2B	. . . . .	[N: of the individual fuel cell] [N1001]
H01M8/04H6K2D	. . . . .	[N: of fuel cell stacks] [N1001]
H01M8/04H6K2F	. . . . .	[N: of auxiliary devices, e.g. batteries, capacitors] [N1001]
H01M8/04H6K4	. . . . .	[N: Current] [N1001]
H01M8/04H6K4B	. . . . .	[N: of the individual fuel cell] [N1001]
H01M8/04H6K4D	. . . . .	[N: of fuel cell stacks] [N1001]
H01M8/04H6K4F	. . . . .	[N: of auxiliary devices, e.g. batteries, capacitors] [N1001]
H01M8/04H6K6	. . . . .	[N: Power, energy, capacity or load] [N1205]
H01M8/04H6K6B	. . . . .	[N: of the individual fuel cell] [N1001]
H01M8/04H6K6D	. . . . .	[N: of fuel cell stacks] [N1001]
H01M8/04H6K6F	. . . . .	[N: of auxiliary devices, e.g. batteries, capacitors] [N1001]
H01M8/04H6K6H	. . . . .	[N: Turning on/off, shunting of fuel cells or fuel cell system components (arrangements or means during start-up or shut-down H01M8/04C8)] [N1205]
H01M8/04H6K8	. . . . .	[N: Other electric variables e.g. resistance or impedance] [N1001]
H01M8/04H6K8B	. . . . .	[N: of the individual fuel cell] [N1001]
H01M8/04H6K8D	. . . . .	[N: of fuel cell stacks] [N1001]
H01M8/04H6K8F	. . . . .	[N: of auxiliary devices, e.g. batteries, capacitors] [N1001]
H01M8/04H8	. . . . .	[N: 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] [N1001]
H01M8/06	. . . . .	Combination of fuel cell with means for production of reactants or for treatment of residues
H01M8/06B	. . . . .	[N: Producing gaseous reactants]
H01M8/06B2	. . . . .	[N: from carbon containing material]
H01M8/06B2A	. . . . .	[N: Reforming processes, e.g. autothermal, partial oxidation or steam reforming] [N0603]
H01M8/06B2B	. . . . .	[N: in a modular combined reactor/fuel cell structure]
H01M8/06B2B2	. . . . .	[N: Reactor construction specially adapted for combination reactor/fuel cell (Hydrogen C01B3/00, reactors for physicochemical processes B01J19/00)] [N1205]
H01M8/06B2D	. . . . .	[N: Direct internal reforming at the anode of the fuel cell] [N0603]

- H01M8/06B2G [N: Gasification of solid fuel] [N9501]
- H01M8/06B4 . . . [N: by dissolution of metals or alloys or by dehydrating metallic substance] [N1205]
- H01M8/06B6 . . . [N: by electrochemical means ([H01M8/06B4](#) takes precedence)]
- H01M8/06C . . [N: Treatment of gaseous reactants or gaseous residues, e.g. cleaning (humidifying or dehumidifying of gaseous reactants [H01M8/04C2E](#))]
- H01M8/06C2 . . . [N: Removal of carbon monoxide or carbon dioxide] [N0603]
- H01M8/06C4 . . . [N: Removal of sulfur] [N0603]
- H01M8/06C6 . . . [N: Reactant purification by the use of electrochemical cells] [N0603]
- H01M8/06C8 . . . [N: Reactant purification by the use of membranes or filters] [N0603]
- H01M8/06D . . [N: Treatment of the electrolyte residue, e.g. reconcentrating]

- H01M8/08 . Fuel cells with aqueous electrolytes
- H01M8/08A . . [N: Alkaline fuel cells] [N0603]
- H01M8/08B . . [N: Phosphoric acid fuel cells (PAFC)] [N0603]

- H01M8/10 . Fuel cells with solid electrolytes
- H01M8/10B . . [N: with anode and cathode gas-diffusion electrodes or electrode layers, e.g. using gaseous or vaporised reactants ([H01M8/12](#) takes precedence)]
- H01M8/10B2 . . . [N: characterised by the electrode/electrolyte combination]
- H01M8/10B2U [N: Undulated, corrugated, curved or wave-shaped membrane-electrode-assemblies (MEA)] [N0603]
- H01M8/10C . . [N: with one of the reactants being liquid, solid or liquid-charged ([H01M8/12](#) takes precedence)]
- H01M8/10C2 . . . [N: Direct methanol fuel cells (DMFC)] [N0603]
- H01M8/10C4 . . . [N: Other direct alcohol fuel cells (DAFC)] [N0603]
- H01M8/10E . . [N: characterised by the electrolyte material ([H01M8/12](#) takes precedence)]
- H01M8/10E2 . . . [N: Polymeric electrolyte material]
- H01M8/10E2B [N: characterised by the chemical structure of the main chain of the ion conducting polymer (membrane support [H01M8/10E2H](#), semi-permeable membrane composition [B01D71/00](#), ion-exchange membrane [C08J5/22](#))] [N1108] [C1207]

- [N: **Note** [N1108]
Multiple classification is done when two or more heteroatoms from O, P, N, S, Si are present
]
- H01M8/10E2B2 [N: having only carbon, e.g. Nafion, vinylsulfonic acid, polyarylenes, polystyrenes, polybutadiene-styrene] [N1108]
- H01M8/10E2B4 [N: having only carbon and oxygen, e.g. polyethers, sulfonated-polyetheretherketones [s-PEEK], sulfonated-polysaccharides, sulfonated-celluloses, sulfonated-polyesters] [N1108]
- H01M8/10E2B6 [N: having carbon, oxygen and other atoms, e.g. sulfonated-polyethersulfones [s-PES], sulfonated-polyphenyl-quinoxaline [s-PPQ]] [N1108]
- H01M8/10E2B8 [N: having nitrogen, e.g. sulfonated-polybenzimidazoles [s-PBI], polybenzimidazoles with phosphoric acid, sulfonated-polyamides [s-PA], sulfonated polyphosphazenes [s-PPh]] [N1108]
- H01M8/10E2B10 [N: having sulfur, e.g. sulfonated polyphosphazene [s-PPh]] [N1205]

H01M8/10E2B12	. . . . .	[N: having phosphorous , e.g. sulfonated polyphosphazene [s-PPh]] [N1108]
H01M8/10E2B14	. . . . .	[N: having silicon, e.g. sulfonated crosslinked polydimethylsiloxane] [N1108]
H01M8/10E2D	. . . . .	[N: being halogenated ,e.g. Nafion, sulfonated polyvinylidene fluoride] [N1108]
H01M8/10E2F	. . . . .	[N: Polymer electrolyte composites, mixtures or blends other than copolymers or grafted polymers] [N1108]
H01M8/10E2F2	. . . . .	[N: Mixtures of polymers with at least one polymer being ionically conductive] [N1108]
H01M8/10E2F4	. . . . .	[N: Mixtures of polymer and additives] [N1108]
H01M8/10E2F4B	. . . . .	[N: Ion conductive additives, e.g. polybenzimidazole with phosphoric acid, ion conducting particles, heteropolyacids or metal phosphate] [N1108]
H01M8/10E2F4D	. . . . .	[N: Non ion conductive additives, e.g. stabilizers, SiO ₂ , ZrO ₂] [N1108]
H01M8/10E2F6	. . . . .	[N: Layers of polymers with at least one layer being ionically conductive] [N1108]
H01M8/10E2F8	. . . . .	[N: Inorganic layers on the polymer electrolytes, e.g. inorganic coatings] [N1108]
H01M8/10E2H	. . . . .	[N: characterized by a porous support having no ionic conductive properties (membrane immobilizing electrolyte solutions or melts H01M8/02E2B , H01M8/02E2C)] [N1108]
H01M8/10E2H2	. . . . .	[N: Chemical composition of the porous support] [N1108]
H01M8/10E2H4	. . . . .	[N: Physical properties of the porous support, e.g. porosity, thickness] [N1108]
H01M8/10E2K	. . . . .	[N: characterized by their form, e.g. perforated, undulated (semi-permeable membranes characterised by their form B01D69/00)] [N1108]
H01M8/10E2M	. . . . .	[N: characterized by their physical properties, e.g. porosity, ionic conductivity, thickness] [N1108]
H01M8/10E2P	. . . . .	[N: characterized by the manufacturing processes (semi-permeable membrane manufacturing processes B01D67/00 ; manufacture of ion-exchange membrane C08J5/22)] [N1108]
H01M8/10E2P2	. . . . .	[N: Chemical reactions, e.g. in-situ polymerisation, in-situ crosslinking] [N1108]
H01M8/10E2P2B	. . . . .	[N: Sol-gel processes] [N1108]
H01M8/10E2P4	. . . . .	[N: Micromachining techniques, e.g. masking, etching steps, photolithography] [N1205]
H01M8/10E2P6	. . . . .	[N: Inducing porosity into non porous precursors membranes, e.g. leaching, pore stretching] [N1108]
H01M8/10E2P8	. . . . .	[N: Starting from polymer solutions, dispersions, slurries other than monomer solutions, dispersions, slurries] [N1108]
H01M8/10E2P10	. . . . .	[N: Starting from polymer melts other than monomer melts] [N1108]
H01M8/10E2P12	. . . . .	[N: After-treatment of the membrane other than polymerisation] [N1108]
H01M8/10E2P12B	. . . . .	[N: chemical modification, e.g. sulfonation] [N1108]
H01M8/10E2P12D	. . . . .	[N: thermal other than drying, e.g. sintering] [N1108]
H01M8/10E2P12F	. . . . .	[N: mechanical, e.g. pressing, puncturing] [N1108]
H01M8/10S	. .	[N: Fuel cells applied on a support, e.g. miniature fuel cell deposited on a silica support] [N0603]

- H01M8/12 . . operating at high temperature, e.g. with stabilised ZrO₂ electrolyte
- H01M8/12B . . . [N: with the anode and the cathode in the form of gas diffusion electrodes]
- H01M8/12B2 [N: characterised by the electrodes, the electrode/electrolyte combination or the supporting material]
- H01M8/12B2A [N: Undulated, corrugated, curved or wave-shaped membrane electrode assemblies (MEA)] [N1205]
- H01M8/12B2S [N: Supporting layer characteristics] [N0203]
- H01M8/12C . . . [N: one of the reactants being solid or liquid]
- H01M8/12E . . . [N: characterised by the process of manufacturing or by the material of the electrolyte]
- H01M8/12E2 [N: the electrolyte consisting of oxides (solid oxides ion conductive electrolyte T01M300/00B8B2H)] [N1205]
- H01M8/12E2B [N: the electrolyte containing zirconium oxide (solid electrolyte based on zirconium oxide T01M300/00B8B2H₂)] [N1205]
- H01M8/12E2C [N: the electrolyte containing cerium oxide] [N9701]
- H01M8/12E2D [N: the electrolyte containing bismuth oxide] [N9901]
- H01M8/12E2H [N: Fuel cells with solid halide electrolytes (solid halide electrolyte T01M300/00B8B4)] [N1205]
- H01M8/12S . . . [N: Fuel cells applied on a support, e.g. miniature fuel cells deposited on a silica support] [N0603]

- H01M8/14 . Fuel cells with fused electrolytes
- H01M8/14B . . [N: the anode and the cathode being gas-permeable electrodes or electrode layers]
- H01M8/14B2 . . . [N: with matrix-supported or semi-solid matrix-reinforced electrolyte]
- H01M8/14C . . [N: with liquid, solid or electrolyte-charged reactants]
- H01M8/14E . . [N: characterised by the electrolyte material]
- H01M8/14E2 . . . [N: comprising carbonates] [N0203]
- H01M8/14H . . [N: Fuel cells with molten hydroxide (molten hydroxide electrolyte T01M300/B6H)] [N1205]
- H01M8/14P . . [N: Measures, other than selecting a specific electrode material, to reduce electrode dissolution] [N0203]

- H01M8/16 . Biochemical fuel cells, i.e. cells in which micro-organisms function as catalysts

- H01M8/18 . Regenerative fuel cells
- H01M8/18B . . [N: Regeneration by thermal means]
- H01M8/18C . . [N: Regeneration by electrochemical means]
- H01M8/18C2 . . . [N: by electrolytic decomposition of the electrolytic solution or the formed water product]
- H01M8/18C4 . . . [N: by recharging of redox couples containing fluids; Redox flow type batteries]

- H01M8/20 . Indirect fuel cells, e.g. Redox cells ([H01M8/18](#) takes precedence)

- H01M8/22 . 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
- H01M8/22B . . [N: Fuel cells in which the fuel is based on compounds containing nitrogen, e.g. hydrazine, ammonia]

- H01M8/22C . . [N: 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]
- H01M8/22D . . [N: Dialytic cells or batteries; Reverse electro dialysis cells or batteries] [N9409]
- H01M8/24 . Grouping of fuel cells into batteries
- H01M8/24B . . [N: comprising spaced diffusion electrodes or electrode layers with interposed electrolyte layer or electrolyte compartment]
- H01M8/24B2 . . . [N: with solid or matrix-supported electrolyte]
- H01M8/24B2E [N: External manifolded battery stock ([H01M8/24B2H](#), [H01M8/24B2M](#) take precedence)]
- H01M8/24B2F [N: comprising framed electrodes or intermediary frame-like gaskets ([H01M8/24B2H](#), [H01M8/24B2M](#) take precedence)]
- H01M8/24B2H [N: High-temperature cells with solid electrolyte]
- H01M8/24B2H2 [N: of tubular or cylindrical configuration]
- H01M8/24B2H4 [N: with monolithic core structure, e.g. honeycombs] [N9602]
- H01M8/24B2M [N: with matrix-supported molten electrolyte]
- H01M8/24B4 [N: comprising spaced diffusion electrodes or electrode layers with interposed electrolyte compartment with possible electrolyte supply or circulation]
- H01M8/24B4F [N: comprising framed electrodes or intermediary frame-like gaskets]
- H01M8/24C . . [N: with liquid, solid or electrolyte-charged reactants]
- H01M8/24C2 . . . [N: with framed electrodes or intermediary frame-like gaskets]
- H01M8/24D . . [N: Details of fuel cell stacks]
- H01M8/24D2 . . . [N: Arrangements for tightening a stack, for accommodation of a stack in a tank, for assembling different tanks] [N1205]
- H01M8/24D2A [N: Enclosures, casings or containers of fuel cells] [N0603]
- H01M8/24D2C [N: Compression means of the fuel cell stack] [N0603]
- H01M8/24D4 . . . [N: Arrangements for sealing or mounting external manifolds around a stack; Manifold structure and material]
- H01M8/24P . . [N: comprising a plurality of stacks, e.g. modular assembly] [N0203]
- H01M8/24P2 . . . [N: of fuel cells of different type] [N0203]

H01M10/00 Secondary cells; Manufacture thereof

Note

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

- H01M10/02 . Details ([of non-active parts H01M2/00](#); [of electrodes H01M4/00](#))
- H01M10/04 . Construction or manufacture in general ([H01M10/12](#), [H01M10/28](#), [H01M10/38](#) take precedence)
- H01M10/04A . . [N: Machines for assembling batteries] [N1205]
- H01M10/04A2 . . . [N: for cells with wound electrodes] [N1205]
- H01M10/04B . . [N: Large-sized flat cells or batteries for motive or stationary systems with plate-like electrodes] [N1205]
- H01M10/04B2 . . . [N: with bipolar electrodes]
- H01M10/04C . . [N: Cells or battery with cylindrical casing] [N1205]

- H01M10/04C2 . . . [N: Button cells]
- H01M10/04D . . [N: Cells with wound or folded electrodes (H01M10/04H takes precedence)] [N1205]
- H01M10/04F . . [N: Small-sized flat cells or batteries portable equipment] [N1205]
- H01M10/04F2 . . . [N: with bipolar electrodes]
- H01M10/04G . . [N: Multimode batteries, e.g. containing auxiliary cells or electrodes switchable in parallel or series connections] [N1205]
- H01M10/04H . . [N: Cells or batteries with folded plate-like electrodes] [N1205]
- H01M10/04H2 . . . [N: Cells or batteries with electrodes of only one polarity folded] [N1205]
- H01M10/04J . . [N: Cells or batteries with folded separator between plate-like electrodes] [N1205]
- H01M10/04K . . [N: Cells or batteries with horizontal or inclined electrodes] [N1205]
- H01M10/04L . . [N: Compression means for stacks of electrodes and separators] [N1205]
- H01M10/04N . . [N: Vertically superposed cells with vertically disposed plates] [N1205]
- H01M10/04P . . [N: with circular plates] [N1205]
- H01M10/04R . . [N: Compression means other than compression means for stacks of electrodes and separators] [N1205]
- H01M10/04T . . [N: Frames for plates or membranes] [N1205]
- H01M10/04U . . [N: Processes for forming or storing electrodes in the battery container]

- H01M10/05 . Accumulators with non-aqueous electrolyte ([H01M10/39](#) takes precedence) [N0706]
- H01M10/052 . . Li-accumulators [N0706]
- H01M10/0525 . . . Rocking-chair batteries, i.e. batteries with lithium insertion or intercalation in both electrodes; Lithium-ion batteries [N0706]
- H01M10/054 . . Accumulators with insertion or intercalation of metals other than lithium, e.g. with magnesium or aluminium [N0706]
- H01M10/056 . . characterised by the materials used as electrolytes, e.g. mixed inorganic/organic electrolytes [N: (electrolytes for hybrid or electric double layer capacitors H01G11/54)] [N1205]
- H01M10/0561 . . . the electrolyte being constituted of inorganic materials only [N0706]
- H01M10/0562 Solid materials [N0706]
- H01M10/0563 Liquid materials, e.g. for Li-SOCl₂ cells [N0706]
- H01M10/0564 . . . the electrolyte being constituted of organic materials only [N0706]
- H01M10/0565 Polymeric materials, e.g. gel-type or solid-type [N0706]
- H01M10/0566 Liquid materials [N0706]
- H01M10/0567 characterised by the additives [N0706]
- H01M10/0568 characterised by the solutes [N0706]
- H01M10/0569 characterised by the solvents [N0706]
- H01M10/058 . . Construction or manufacture [N0706]
- H01M10/0583 . . . 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 [N0706]
- H01M10/0585 . . . of accumulators having only flat construction elements, i.e. flat positive electrodes, flat negative electrodes and flat separators [N0706]
- H01M10/0587 . . . of accumulators having only wound construction elements, i.e. wound positive electrodes, wound negative electrodes and wound separators [N0706]

- H01M10/06 . Lead-acid accumulators ([semi-lead accumulators H01M10/20](#))

- H01M10/08 . . Selection of materials as electrolytes
- H01M10/10 . . . Immobilising of electrolyte
- H01M10/12 . . Construction or manufacture
- H01M10/12A . . . [N: Valve regulated lead acid batteries [VRLA]] [N1205]
- H01M10/12B . . . [N: Multimode batteries]
- H01M10/12C . . . [N: Cells or batteries with cylindrical casing] [N1205]
- H01M10/12C2 [N: Button cells]
- H01M10/12D . . . [N: Cells or batteries with wound or folded electrodes]
- H01M10/12F . . . [N: Small-sized flat cells or batteries for portable equipment ([H01M10/12C](#) and [H01M10/12D](#) take precedence)]
- H01M10/12F2 [N: with bipolar electrodes]
- H01M10/12U . . . [N: Processes for forming or storing electrodes in the battery container]
- H01M10/14 . . . Assembling a group of electrodes or separators
- H01M10/16 Suspending or supporting electrodes or groups of electrodes in the case
- H01M10/18 . . with bipolar electrodes

- H01M10/20 . Semi-lead accumulators, i.e. accumulators in which only one electrode contains lead
- H01M10/22 . . Selection of materials as electrolytes

- H01M10/24 . Alkaline accumulators
- H01M10/26 . . Selection of materials as electrolytes
- H01M10/28 . . Construction or manufacture
- H01M10/28B . . . [N: Large cells or batteries with stacks of plate-like electrodes]
- H01M10/28B2 [N: with bipolar electrodes]
- H01M10/28C . . . [N: Cells or batteries with two cup-shaped or cylindrical collectors ([H01M10/28B](#) takes precedence)]
- H01M10/28C2 [N: Button cells]
- H01M10/28D . . . [N: Cells or batteries with wound or folded electrodes]
- H01M10/28F . . . [N: Small-sized flat cells or batteries for portable equipment ([H01M10/28C](#) and [H01M10/28D](#) take precedence)]
- H01M10/28U . . . [N: Processes for forming or storing electrodes in the battery container]
- H01M10/30 . . Nickel accumulators ([H01M10/34](#) takes precedence)
- H01M10/32 . . Silver accumulators ([H01M10/34](#) takes precedence)

- H01M10/34 . Gastight accumulators
- H01M10/34B . . [N: Gastight lead accumulators ([H01M10/12A](#) takes precedence)] [N1205]
- H01M10/34D . . [N: Gastight metal hydride accumulators] [N1205]
- H01M10/34D2 . . . [N: with solid electrolyte]

- H01M10/36 . Accumulators not provided for in groups [H01M10/05-H01M10/34](#) [N1205]
- H01M10/36B . . [N: Zinc-halogen accumulators]
- H01M10/38 . . Construction or manufacture
- H01M10/39 . . Working at high temperature
- H01M10/39B . . . [N: Sodium-sulfur cells]

- H01M10/39B2 [N: characterised by the electrolyte]
- H01M10/39B2B [N: Several layers of electrolyte or coatings containing electrolyte]
- H01M10/39B2D [N: Electrolyte with a shape other than plane or cylindrical]
- H01M10/39B4 [N: containing additives or special arrangements in the sodium compartment] [N1206]
- H01M10/39B6 [N: containing additives or special arrangement in the sulfur compartment] [N1206]
- H01M10/39B8 [N: Sealing means between the solid electrolyte and holders] [N1206]
- H01M10/39B10 [N: Flexible parts] [N1206]
- H01M10/39B14 [N: Flat cells] [N1206]
- H01M10/39D [N: Cells with molten salts]

- H01M10/42 Methods or arrangements for servicing or maintenance of secondary cells or secondary half-cells
- H01M10/42B . . . [N: for several batteries or cells simultaneously or sequentially]
- H01M10/42C . . . [N: Arrangements for moving electrodes or electrolyte]
- H01M10/42K . . . [N: with battery type recognition] [N1205]
- H01M10/42L . . . [N: Leak testing of cells or batteries] [N1205]
- H01M10/42M . . . [N: Safety or regulating additives or arrangements in electrodes, separators or electrolyte ([H01M10/42R](#) takes precedence)] [N9705]
- H01M10/42R . . . [N: Regeneration of electrolyte or reactants]
- H01M10/42S . . . [N: Structural combination with electronic components, e.g. electronic circuits integrated to the outside of the casing (printed circuits [H05K1/00](#))] [N1205]
- H01M10/42S2 [N: Smart batteries, e.g. electronic circuits inside the housing of the cells or batteries] [N1205]
- H01M10/42S4 [N: with capacitors] [N1205]
- H01M10/42T . . . [N: Testing apparatus]
- H01M10/44 Methods for charging or discharging ([circuits for charging \[H02J7/00\]\(#\)](#))
- H01M10/44B [N: for several batteries or cells simultaneously or sequentially] [C9705]
- H01M10/44D [N: in response to temperature] [C1206]
- H01M10/44E [N: in response to gas pressure] [C1206]
- H01M10/44V [N: Initial charging measures] [N1205]
- H01M10/44W [N: End of discharge regulating measures] [N1205]
- H01M10/46 Accumulators structurally combined with charging apparatus ([circuits for charging \[H02J7/00\]\(#\)](#))
- H01M10/46B [N: with solar battery as charging system]
- H01M10/48 Accumulators combined with arrangements for measuring, testing or indicating condition, e.g. level or density of the electrolyte ([N: [H01M10/44](#) takes precedence]; indicating or measuring level of liquid in general [G01F23/00](#); measuring density [G01N](#), e.g. [G01N9/00](#); measuring electric variables [G01R](#))
- H01M10/48B [N: for several batteries or cells simultaneously or sequentially] [C9705]
- H01M10/48C [N: for measuring electrolyte level, electrolyte density or electrolyte conductivity] [C1206]
- H01M10/48D [N: for measuring temperature] [C1206]
- H01M10/48F [N: Cells or batteries combined with indicating means for externally visualisation of the condition, e.g. by change of colour or of light intensity] [C1206]

- H01M10/50 . . Heating or cooling or regulating temperature ([control of temperature in general G05D23/00](#)) [C9409]
- H01M10/50C . . . [N: Types of temperature regulation] [N1104]
- [N: **WARNING**Groups [H01M10/50C](#) to [H01M10/50M4](#) are not complete, pending reclassification. See also [H01M10/50](#), [H01M10/50B](#), [T01M6/50S2-T01M6/50S2R](#) [N1104]
- H01M10/50C2 [N: Cooling or keeping cold] [N1104]
- H01M10/50C4 [N: Heating or keeping warm] [N1104]
- H01M10/50C6 [N: Uniformity or distribution of temperature in space] [N1104]
- H01M10/50D [N: specially adapted for a specific application] [N1104]
- H01M10/50D2 [N: Portable devices, e.g. mobiles, cameras, pacemakers] [N1104]
- H01M10/50D2B [N: Power tools] [N1104]
- H01M10/50D4 [N: Vehicles] [N1104]
- H01M10/50D6 [N: Stationary plants, e.g. power plant buffering, backup power supplies] [N1104]
- H01M10/50F [N: Control systems (measurement of temperature [H01M10/48D](#); charging and discharging in response to temperature [H01M10/44D](#))] [N1104]
- H01M10/50F2 [N: characterized by method steps, e.g. algorithms, flow charts, software details] [N1104]
- H01M10/50F4 [N: based on ambient temperature] [N1104]
- H01M10/50F6 [N: characterised by the use of reversible temperature sensitive devices, e.g. NTC, PTC, bimetal or by control of the internal current flowing through the battery, e.g. by switching ([H01M2/34](#) takes precedence; **Temperature sensitive safety devices for primary or secondary batteries** [T01M200/10](#))] [N1104] [C1207]
- H01M10/50H [N: characterized by the shape of the cells] [N1104]
- H01M10/50H2 [N: Cylindrical] [N1104]
- H01M10/50H4 [N: Prismatic or flat, e.g. pouch cells] [N1104]
- H01M10/50K [N: Means for temperature regulation having parts combined with the battery] [N1104] [C1109]
- H01M10/50K2 [N: characterized by values or quantitative relationships, e.g. ratios, sizes, formulas, concentrations] [N1104]
- H01M10/50K4 [N: characterized by gradients (**temperature gradients** [H01M10/50C6](#))] [N1104]
- H01M10/50K6 [N: characterized by electrically insulating, thermally conductive materials] [N1104]
- H01M10/50K8 [N: inside the innermost case of the battery, e.g. mandrels, electrodes, electrolytes] [N1104]
- H01M10/50K10 [N: Solid structures for heat-exchange or conduction] [N1104]
- H01M10/50K10B [N: Surfaces specially adapted for heat dissipation or radiation, e.g. fins, coatings] [N1104]
- H01M10/50K10D [N: Closed pipes transferring heat by thermal conductivity and phase transition, e.g. heat pipes] [N1104]
- H01M10/50K10F [N: Terminals or leads] [N1104]
- H01M10/50K10H [N: Solid parts specially adapted for heat conduction other than terminals or leads, e.g. rods, plates] [N1104]

H01M10/50K10H2	. . . . .	[N: arranged between the cells] [N1104]
H01M10/50K10K	. . . . .	[N: Solid parts with flow channels or tubes for heat exchange] [N1104]
H01M10/50K10K2	. . . . .	[N: arranged between the cells] [N1104]
H01M10/50K12	. . . . .	[N: Fluids for heat exchange] [N1104]
H01M10/50K12B	. . . . .	[N: Gases] [N1104]
H01M10/50K12B2	. . . . .	[N: freely flowing by convection only] [N1104]
H01M10/50K12B4	. . . . .	[N: forcedly flowing, e.g. by blowers] [N1104]
H01M10/50K12B4B	. . . . .	{7 dots} [N: Compressed gases] [N1104]
H01M10/50K12B4D	. . . . .	{7 dots} [N: Recirculation or a U-turn in the flow path, i.e. back and forth (H01M10/50K12B4B takes precedence)] [N1109]
H01M10/50K12B6	. . . . .	[Means within the gas flows giving the gas flows around a cell or a battery a certain direction, e.g. manifolds, baffles, obstacles] [N1104] [C1109]
H01M10/50K12D	. . . . .	[N: Liquids] [N1104]
H01M10/50K12D2	. . . . .	[N: characterised by flow circuits external to the battery or the battery pack] [N1104] [M1109]
H01M10/50K12F	. . . . .	[N: Fluids undergoing a liquid-gas phase change, e.g. evaporation, condensation (heat pipes H01M10/50K10D)] [N1104]
H01M10/50K14	. . . . .	[N: Electric or electromagnetic means (H01M2/34 takes precedence)] [N1205]
H01M10/50K14B	. . . . .	[N: Resistor heaters (arrangements for heating the battery by its resistance to internal current H01M10/50F6)] [N1104] [C1109]
H01M10/50K14D	. . . . .	[N: Peltier elements or thermo-electric devices] [N1104]
H01M10/50K16	. . . . .	[N: Thermal insulation or shielding] [N1104]
H01M10/50K18	. . . . .	[N: Heat storage or buffering, e.g. heat capacity, liquid-solid phase changes] [N1104]
H01M10/50K20	. . . . .	[N: Chemical reactions other than electrochemical reactions of the battery, e.g. catalytic heaters, burners] [N1104]
H01M10/50M	. . . . .	[N: Heat exchange relationships between a battery and another system, e.g. air-conditioners, central heating systems, vehicle engines, electronic components, fuel cells, capacitors)] [N1104]
H01M10/50M2	. . . . .	[N: the system being an air-conditioner or an engine] [N1104]
H01M10/50M4	. . . . .	[N: the system being an electronic component, e.g. CPU, inverter, capacitor] [N1104]
H01M10/52	. . .	Removing gases inside the secondary cell, e.g. by absorption (vent plugs or other mechanical arrangements for facilitating escape of gases H01M2/12)
H01M10/52C	. . .	[N: by recombination on a catalytic material] [N1205]
H01M10/52E	. . .	[N: by gas recombination on the electrode surface or by structuring the electrode surface to improve gas recombination] [N1205]
H01M10/54	. . .	Reclaiming serviceable parts of waste accumulators

H01M12/00 **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.

- H01M12/00B . [N: composed of a half-cell of the capacitor type and of a half-cell of the primary or secondary battery type (hybrid capacitors [H01G9/155](#))] [N0806]
- H01M12/02 . Details (of non-active parts [H01M2/00](#); of electrodes [H01M4/00](#))
- H01M12/04 . 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 [H01M6/50](#))
- H01M12/06 . . with one metallic and one gaseous electrode
- H01M12/06F . . . [N: with plate-like electrodes or stacks of plate-like electrodes]
- H01M12/08 . 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, [H01M10/42](#))
- H01M12/08B . . [N: Zinc-halogen cells or batteries]
- H01M14/00** **Electrochemical current or voltage generators not provided for in groups [H01M6/00](#) - [H01M12/00](#); Manufacture thereof [C0706]**
- H01M14/00B . [N: Photoelectrochemical storage cells (light sensitive devices [H01G9/20](#), semiconductors sensitive to light [H01L31/00](#)) [N1205]
- H01M16/00** **Structural combinations of different types of electrochemical generators**
- H01M16/00F . [N: of fuel cells with other electrochemical devices, e.g. capacitors, electrolyzers] [N1205]
- H01M16/00F2 . . [N: of fuel cells with rechargeable batteries] [N1205]