



ELSEVIER

Journal of Power Sources 78 (1999) 289–299

JOURNAL OF
**POWER
SOURCES**

***Patents* ALERT**

This section contains abstracts of recently issued patents in the United States and published patent applications filed from over 90 countries under the Patent Cooperation Treaty and compiled in accordance with interest profiles developed by the Editors. Patents included in this section have been recently issued by the United States Patent and Trademark Office but some may have been issued previously in other countries.

Further information about complete patents can be obtained from:

REEDFAX Document Delivery System
275 Gibraltar Road, Horsham, PA 19044, USA

Phone: +1 215 441-4768

Fax: +1 215 441-5463

who offer a 24-hour, 7-days a week service.

See overleaf for details of a special service for readers of
Journal of Power Sources



Free to readers of: *Journal of Power Sources*

REEDFAX™ Document Delivery System FAX FORM

FAX TODAY (our local international access code) **+1-215-441-5463**

As a first-time user, you are eligible to receive 5 FREE U.S. patents (*you pay only for the cost of delivery*). Complete and return to confirm your personal 24-hour REEDFAX™ account number.

Yes! By return fax, please confirm my personal 24-hour REEDFAX account number and put me on-line — without cost or obligation — for **5 FREE United States patents** (*excluding delivery charges*).

AUTHORIZED SIGNATURE _____

NAME (please print) _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____

STATE _____

ZIP _____

PHONE _____

FAX _____

Alternate FAX (if desired) _____

Name to appear on faxed patent documents. If same as above, check box:

NAME (please print) _____

Check here if you plan to use Client Numbers (Client charge-back numbers)

Tax exempt number (For PA, FL and NY) _____

Name and address for billing. If same as above, check box:

Please list your other locations or other individuals who would be interested in REEDFAX Document Delivery System. Use additional sheets if necessary.

LEAD ACID**5827347****PROCESS FOR THE RECOVERY OF LEAD FROM SPENT BATTERIES**

Margulis Efi Hafia, ISRAEL assigned to Margulead Ltd

A process for the recovery of lead from spent battery paste and lead containing materials. The process includes the steps of calcination of a spent paste treated with an alkali carbonate or hydroxide or any mixture thereof, and elemental sulphur at a temperature of up to 600°C, followed by washing with water. The calcined and washed paste is dissolved in an alkali molten electrolyte, and lead is electrowinned from the alkali molten electrolyte. The spent electrolyte is reused in the process.

5828201**METHOD FOR MAINTAINING THE CHARGE CAPACITY OF TRACTION BATTERY MODULES OF A HYBRID ELECTRIC VEHICLE**

Hoffman David William; Grewe Timothy Michael Port Crane, NY, UNITED STATES assigned to Lockheed Martin Corporation

A hybrid electric vehicle includes a lead-acid traction battery made up of a plurality of series-connected modules. During operation of the vehicle, the traction battery is discharged for acceleration, and charged by an ancillary power source. The traction battery is desirably not fully charged at the beginning of a day's operation, so that overcharging cannot occur, so the battery spends long periods of time in a partially charged condition. When not fully charged for long periods of time, sulfation may reduce the charge storage capacity of the battery. A maintenance procedure takes place when the vehicle is not operating, in which one or more modules of the traction battery, but less than all the modules, are fully charged, then partially discharged. The full charging tends to reduce sulfation in the particular module being maintained, and the partial discharge restores its charge condition to that prior to the full charge. Each of the modules is eventually maintained by a programmed controller. The charging energy comes from an auxiliary battery, and the discharge energy is returned to the auxiliary battery, so there is little net loss

of energy. If maintenance procedure is interrupted before full charge of a module, that module is scheduled for the next maintenance. If the maintenance is interrupted before partial discharge, the partial discharge is accomplished by equalizing the voltage of the battery modules.

FUEL CELL**5827495****MOLTEN CARBONATE FUEL CELL AND METHOD OF MANUFACTURING RETAINING MATERIAL FOR ELECTROLYTE BODY OF MOLTEN CARBONATE FUEL CELL**

Tomimatsu Norihiro; Ohzu Hideyuki; Akasaka Yoshihiro; Nakagawa Kazuaki Kawasaki, JAPAN assigned to Kabushiki Kaisha Toshiba

A molten carbonate fuel cell comprises a fuel electrode, an oxidizing agent electrode, and an electrolyte body prepared by impregnating a porous body including a retaining material and a reinforcing material with an electrolyte containing an alkali carbonate. The retaining material consists essentially of alpha-lithium aluminate ($\alpha\text{-LiAlO}_2$) having at most 0.60 degrees of a half value width of (104) peak in an X-ray powder diffractometry.

5827620**SOLID OXIDE FUEL CELL STRUCTURES**

Kendall Kevin Runcorn, UNITED KINGDOM assigned to Keele University

PCT No. PCT/GB94/00549 Sec. 371 Date Nov. 24, 1995 Sec. 102(e) Date Nov. 24, 1995 PCT Filed Mar. 17, 1994 PCT Pub. No. WO94/22178 PCT Pub. Date Sep. 29, 1994. Solid oxide fuel cell structures which are capable of relatively rapid temperature changes without cracking and which are simple to seal. In one arrangement, a tubular SOFC structure comprises a self-supporting extruded tube of zirconium oxide with inner and outer electrodes. The tube may have an outside diameter of from, for example, 1 to 5 mm and a wall thickness of from, for example, 50 to 200 microns. In an alternative arrangement, a simple gas type planar interconnect for a planar SOFC is provided in the form of a sheet of ceramic material having electrically conducting bodies of ceramic material embedded in it so

as to provide an electrical path through the sheet. To avoid edge sealing problems, fuel gas and air may be delivered to a stacked SOFC structure through tubes extending between adjacent cell sub-assemblies such that the gas is delivered to a central portion of each anode of the cell stack and flows outwards towards the edges of the stack.

5830592

SOLID ELECTROLYTE FUEL CELL

Akagi Kosuke Ikoma, JAPAN assigned to Osaka Gas Company Ltd

A fuel cell includes a multi-layered cell assembly having a stacked plurality of unit cells. Each unit includes a plate-like electrolyte layer having an oxygen electrode on one face thereof and a fuel electrode on the other face thereof, an oxygen-containing gas passage facing the oxygen electrode and a fuel gas passage facing the fuel electrode. An exhaust gas passage is formed adjacent end faces of the stacked unit cells. The oxygen-containing gas passage discharges oxygen-containing gas to the exhaust gas exhaust passage, whereas the fuel gas passage discharges fuel gas to the exhaust gas exhaust passage. The oxygen-containing gas passage includes an oxygen-containing gas passage extension portion for forming an oxygen-containing gas passage exit opening remotely from the end face of the unit cell, and the fuel gas passage includes a fuel gas passage extension portion for forming a fuel gas passage exit opening remotely from the end face of the unit cell.

5830593

**ROTATING ELECTRODE FUEL CELL
FOR VEHICLE PROPULSION**

Nielson Jay P Salt Lake City, UT, UNITED STATES

A fuel cell system for use in vehicles has a hydrogen electrode assembly, an oxygen electrode assembly, and a body of liquid electrolyte between the hydrogen electrode assembly and the oxygen electrode assembly. The hydrogen electrode assembly has a hydrogen sparger that releases fine bubbles of hydrogen gas into the electrolyte, and a hydrogen catalyst electrode having pores through which flow the electrolyte and bubbles of hydrogen gas.

5833452

**COATED METAL SINTERING CARRIERS
FOR FUEL CELL ELECTRODES**

Donelson Richard; Bryson E S Glen Waverly, AUSTRALIA assigned to M-C Power Corporation

A carrier for conveying components of a fuel cell to be sintered through a sintering furnace. The carrier comprises a metal sheet coated with a water-based carbon paint, the water-based carbon paint comprising water, powdered graphite, an organic binder, a wetting agent, a dispersing agent and a defoaming agent.

5837393

FUEL BATTERY SYSTEM

Okamoto Takafumi Wako, JAPAN assigned to Honda Giken Kogyo Kabushiki Kaisha

A fuel cell system has a fuel cell assembly and an oxygen-containing gas supply. The oxygen-containing gas supply has a passage for introducing atmospheric air, and includes a catalytic converter for selectively oxidizing carbon monoxide contained in the air introduced into the passage, an air compressor, and an intercooler. The catalytic converter, the air compressor, and the intercooler are successively disposed in the passage. The air from which carbon monoxide has been removed by the catalytic converter is supplied as an oxidizing gas to the fuel cell assembly.

5837395

**CORROSION RESISTANT FUEL CELL
ASSEMBLY**

Breault Richard D; Fredley Robert R; Scheffler Glenn W Coventry, CT, UNITED STATES assigned to International Fuel Cells

The present invention discloses a corrosion resistant fuel cell in which an ion impermeable protective layer is positioned over at least a portion of the noncatalyzed carbon based components. This layer prevents reactant ions or molecules from reaching localized high potential areas of these components and corroding the carbon material.

BATTERY MATERIALS

5827331

ELECTRODE COMPOSITIONS

Block Jacob; Fan Xiyun Rockville, MD, UNITED STATES assigned to W R Grace & Co -Conn

An electrode composition for use as an electrode in a non-aqueous battery system. The electrode composition contains an electrically active powder in a solid polymer and, as a dispersant, a C8-C15 alkyl capped oligomer of a hexanoic acid that is electrochemically inert at 2.5-4.5 volts.

5830599

SEALED RECHARGEABLE BATTERY

Okamoto Miho; Hamada Shinji; Inoue Hiroshi; Ikoma Munehisa Sakai, JAPAN assigned to Matsushita Electric Industrial Company Ltd

A long-life sealed rechargeable battery employing a plastic battery container in use for electric vehicles and the like, wherein at least one tube having the bottom is formed under the cover, the closed end of the tube is either brought as close as possible to the upper edge of the electrode group or put into direct contact with a lead tab of the positive or negative electrode, and a temperature sensor is inserted and fixed inside the tube in such a way that the temperature sensing part comes into direct contact with the inner surface of the closed end of the tube, thereby capable of measuring from the outside temperature variation in the cell so as to control charge and discharge.

5830600

NONFLAMMABLE/SELF-EXTINGUISHING ELECTROLYTES FOR BATTERIES

Narang Subhash C; Ventura Susanna; Dougherty Brian; Zhao Ming; Smedley Stuart; Koolpe Gary Palo Alto, CA, UNITED STATES assigned to SRI International

Novel fire-retardant electrolyte compositions are provided. These compositions comprise a lithium salt dissolved in a fire-retardant solvent selected from the group consisting of phosphates, phospholanes, cyclophosphazenes, silanes, fluorinated carbonates, fluorinated polyethers and mixtures thereof. The electrolyte composition optionally contains a

CO₂-generating compound. Also provided are fire-retardant batteries and fire-retardant conductive films formulated with such compositions, as well as methods of manufacturing such films.

5830603

SEPARATOR FILM FOR A STORAGE BATTERY

Oka Yoshio; Uemiya Takafumi; Sakamoto Takeshi; Harada Akira Osaka, JAPAN assigned to Sumitomo Electric Industries Ltd

A separator film for a battery is formed as a hydrophilized porous biaxially oriented film. The porous biaxially oriented film has a porosity of at least about 70%, a thickness in the range of about 10 to about 500 μm , and a pore size in the range of about 0.01 to about 20 μm . The porous film is made of hydrophobic resin, and a hydrophilic high polymer which is fixed in the pores of the film. The hydrophilic high polymer may be heterogeneously distributed in the porous film, so that the separator film has a hydrophilic portion and a hydrophobic portion. The porosity and/or the pore size of the porous film can be varied in the direction of film thickness. The separator film is applied in an alkaline storage battery or a nonaqueous electrolyte battery such as a lithium battery.

5834135

MULTILAYERED GEL ELECTROLYTE BONDED RECHARGEABLE ELECTROCHEMICAL CELL

Pendalwar Shekhar L; Howard Jason N; Venugopal Ganes; Oliver Manuel Lawrenceville, GA, UNITED STATES assigned to Motorola Inc

An electrochemical cell 10 includes first and second electrodes 12 and 14 with an electrolyte system 26 disposed therebetween. The electrolyte system includes at least a multilayered first polymeric region 28, having second layers 30 and 32, of a second polymer material. The second layers may absorb an electrolyte active species and to adhere the adjacent layer of electrode material to the electrolyte 26. The electrolyte system further includes a process for packaging and curing the electrolyte after it has been incorporated into a discrete battery device.

5834136**METHOD OF PREPARING POLYMERIC ELECTROLYTES**

Gao Feng; Mitchell Porter Henderson, NV, UNITED STATES assigned to Valence Technology Inc

A method of fabricating polymeric matrices suitable for use in non-aqueous electrochemical cells is provided. The method includes forming an organic emulsion comprising an organic solvent and having a polar phase comprising polar polymer precursors and a non-polar phase comprising non-polar polymer precursors wherein the polar phase is substantially immiscible in the non-polar phase, said emulsion further including an effective amount of surfactant to maintain said emulsion; and initiating polymerization of said polar polymer precursors to form first polymers and of said non-polar polymer precursors to form second polymers wherein said first polymers are crosslinked by said second polymers to form a polymeric matrix. The polymeric matrix will have superior physical strength and puncture resistance.

5834138**NEGATIVE ELECTRODE MATERIAL FOR NON-AQUEOUS LIQUID ELECTROLYTE SECONDARY CELL AND NON-AQUEOUS LIQUID ELECTROLYTE SECONDARY CELL EMPLOYING SAME**

Yamada Shinichir; Akashi Hiroyuki; Imoto Hiroshi; Azuma Hideto; Kitamura Kenichi; Adachi Momoe; Sasaki Terue; Tanaka Kohichi Kanagawa, JAPAN assigned to Sony Corporation

PCT No. PCT/JP96/00548 Sec. 371 Date Nov. 6, 1996 Sec. 102(e) Date Nov. 6, 1996 PCT Filed Mar. 6, 1996 PCT Pub. No. WO96/27911 PCT Pub. Date Dec. 9, 1996. A negative electrode material for a secondary cell for a non-aqueous liquid electrolyte for realizing a high charging/discharging capacity and a high discharging efficiency, a method for producing such material and a non-aqueous liquid electrolyte secondary cell employing such material. The negative electrode material contains at least one carbonaceous material selected from the group consisting of coffee beans, tea leaves, cane sugar, corns, fruits, straws of cereals and husks of cereals, a carbonaceous material derived from a plant-origin high molecular material containing a sum total of 0.2 to 20 wt

% of metal elements, phosphorus and sulphur calculated as elements or a carbonaceous material having a diffraction peak between 30° and 32° of the 2 theta diffraction angle in the X-ray (CuK alpha) powder diffraction pattern. For producing the negative electrode material, at least one carbonaceous material selected from the group consisting of coffee beans, tea leaves, cane sugar, corns, fruits, straws of cereals and husks of cereals, or crystalline or fibrous cellulose admixed with at least one of metal elements, phosphorus or sulphur, is sintered for carbonization. The negative electrode material is used for a non-aqueous liquid electrolyte secondary cell having a positive electrode formed of a lithium compound oxide and a negative electrode formed of a carbonaceous negative electrode material capable of doping and dedoping lithium ions as an active negative electrode material.

5837157**POLYMER SOLID ELECTROLYTE**

Kohjiya Shinzo; Ikeda Yuko; Miura Katsuhito; Shoji Shigeru; Matoba Yasuo; Watanabe Masayoshi; Sakashita Takahiro Kyoto, JAPAN assigned to Daiso Company Ltd

A polymer solid electrolyte which is superior to a conventional solid electrolyte in ion conductivity and also superior in processing characteristics, molding characteristics, mechanical strength and flexibility. The polymer solid electrolyte produced by formulating a soluble electrolyte salt compound to a polyether copolymer having an oligooxyethylene side chain and an electrolyte salt compound which is soluble in the polyether copolymer, the polyether polymer being a solid random copolymer having a main chain structure consisting of 5 to 30 molar % of a structural unit of the following formula (1) and 95 to 70 molar % of a structural unit of the following formula (2), and the polyether polymer having a polymerization degree n of an oxyethylene unit of the side chain part of the formula (1) of 1 to 12, a number-average molecular weight of 100,000 to 2,000,000, a glass transition point measured by a differential scanning calorimeter (DSC) of not more than -60°C and a melting calorie of not more than 70 J/g. (*See Patent for Chemical Structure*) (1) (CH₂CH₂O) (2)

5837317**METHOD OF PRODUCING HYDROGEN STORAGE ALLOY FOR BATTERY**

Moriwaki Yoshio; Izumi Yoichi; Yamamura Yasuharu; Kaiya Hideo Hirakata, JAPAN assigned to Matsushita Electric Industrial Company Ltd

The present invention provides a method of producing a hydrogen storage alloy low in cobalt content which restrains a decrease in cycle life characteristic and preservation characteristic of an alkaline storage battery when the alloy is used as a negative electrode. The method includes the following steps. An Mm-Ni system hydrogen storage alloy which has a crystal structure of CaCu₅ and contains 15 atom % or less of cobalt is powdered to have an average particle diameter of 10-100 μm. Then, the powdered alloy is immersed in a treatment solution at 80°-130°C, the treatment solution comprising an alkaline aqueous solution containing 10 g/l or more of lithium hydroxide and having a specific gravity of 1.1 or higher, and cobalt ions which is contained in the alkaline aqueous solution, thereby forming a layer containing nickel and cobalt in higher concentration than in the bulk of the powdered alloy onto the alloy surface.

5837396**NEGATIVE ELECTRODE CONSTRUCTION FOR A SECONDARY BATTERY**

Han Kyeng-Ho Suwon, KOREA assigned to Samsung Display Devices Company Ltd

A secondary battery has a cylindrically wound laminate made up of a positive electrode plate, a negative electrode plate, and a separator plate interposed therebetween. The wound laminate is enclosed within a protective can, which also encloses a volume of electrolyte. The negative electrode plate includes a support member, an electrolytically active substance disposed on at least one surface of the support member, and a supplementary support embedded in the electrolytically active substance. The supplementary support is in the form of an electrically conductive network formed from a plurality of entangled and interconnected conductive members, and is used to improve the electrical conductivity of negative electrode.

5837398**RADIATION CURABLE SEALING MATERIAL FOR BATTERIES**

Adams John E; Hirabayashi Kazuhiro; Takeoka Toru Cincinnati, OH, UNITED STATES assigned to Three Bond Company Ltd

The present application discloses battery sealant compositions which exhibit excellent flexibility and chemical (alkalinity) resistance properties without requiring the use of organic solvents. These compositions comprise an epoxy resin, such as polybutadiene epoxy resin; a polyol material, such as a butadiene polyol; a cationic photoinitiator; and optionally a radiation curable monomer, such as a vinyl ether monomer. Electrochemical (battery) cells which incorporate a seal made by the photoinitiated polymerization of this material is also disclosed.

5837400**IONICALLY CONDUCTIVE MATERIALS INCLUDING BIS(PHENYLSULPHONYL)IMIDES**

Baudry Paul; Majestre Hervacue Reibel Lacu eonard; Bayoud Sami Avon, FRANCE assigned to Electricite de France-Service National

The invention relates to ionically conductive materials including at least one compound corresponding to the following formula (I): (*See Patent for Chemical Structure*) (I) in which the groups X and X' are identical or different and denote at least one electrophilic group in an ortho, meta and/or para position and M denotes an alkali or alkaline-earth metal, in solution in a solvent including a macromolecular material or a polar aprotic solvent or solvent mixture. The electrophilic groups X, X' may be chosen from nitro, C1-C5 perfluoroalkyl, CN, halogen, vinyl, CO₂R and SO₂R groups where R denotes a C1-C5 linear or branched alkyl radical and the metal M may be chosen from lithium, sodium, potassium, caesium, magnesium, calcium and barium. The invention also relates to a process for the preparation of the abovementioned compounds. The invention applies more particularly to the manufacture of electrochemical generators including an electrolyte based, at least partially, on these ionically conductive materials.

5837402**ZINC POWDERS FOR USE IN BATTERIES
AND A SECONDARY ALKALINE ZINC
BATTERY USING SAID ZINC POWDERS**

Araki Kiyoshi; Kaga Masamitsu; Kitamura Toshiya;
Yanagisawa Makiko; Sato Fumihiro Tokyo, JAPAN
assigned to Dowa Mining Co Ltd

Zinc powder comprising particles having part or all of their surfaces coated either with copper and/or indium or with silver is used as a battery material or an active material for the negative electrode in a battery. The powder can be used as an anode active material in a secondary battery to achieve a higher discharge capacity and better cycle characteristics.

LITHIUM BATTERIES**5833844****THERMALLY-DRIVEN ION-EXCHANGE
PROCESS FOR LITHIUM RECOVERY**

Leavitt Frederick Wells Amherst, NY, UNITED STATES assigned to Praxair Technology Inc

Ions (e.g. lithium) can be removed or recovered from brines containing those ions and optionally one or more other ions (e.g. other alkali metal ions) by the use of a temperature-swing, ion-exchange process and apparatus employing an ion-exchange material. The process and apparatus depends on a change in the selectivity coefficient of an ion exchange material for the ions desired to be recovered with a change in temperature, resulting in desirable ions being relatively selectively released at one temperature and undesirable ions being relatively selectively released at another temperature. The process of the invention can be used to effect the separation of any ion (or set of ions) from another ion or from a set of ions wherein the selectivity coefficient for one ion (or set of ions) has a substantial temperature dependence, compared to that for the other ion (or set of ions).

5834137**THIN FILM METHOD OF CONDUCTING
LITHIUM-IONS**

Zhang Ji-Guan; Benson David K; Tracy C Edwin
Golden, CO, UNITED STATES assigned to Midwest
Research Institute

The present invention relates to the composition of a solid lithium-ion electrolyte based on the $\text{Li}_2\text{O-CeO}_2\text{-SiO}_2$ system having good transparent characteristics and high ion conductivity suitable for uses in lithium batteries, electrochromic devices and other electrochemical applications.

5834139**NEGATIVE ELECTRODE MATERIAL
FOR USE IN LITHIUM SECONDARY
BATTERIES AND LITHIUM SECONDARY
BATTERIES INCORPORATING THIS
MATERIAL**

Shodai Takahisa; Okada Shigeto; Tobishima Shin-ichi;
Yamaki Jun-ichi Mito, JAPAN assigned to Nippon
Telegraph and Telephone Corporation

A negative electrode material for use in lithium secondary batteries contains a negative electrode active material container made from an amorphous transition metal nitride containing lithium represented by the chemical formula $\text{Li}_{1+x}\text{MyN}$, where M represents one or more elements selected from; a transition metal, group IIIA, group IVA, and group VA, and contains at least a transition metal, x is within the range from -0.2 to 2.0, and y is within the range from 0.1 to 0.6.

5837397**LAMINAR (FLAT OR PAPER-TYPE)
LITHIUM-ION BATTERY WITH SLURRY
ANODES AND SLURRY CATHODES**

Xing Xuekun Richmond Heights, OH, UNITED STATES assigned to Gould Electronics Inc

In one embodiment, the present invention provides a lithium-ion battery and a method of preparing a lithium-ion battery containing a slurry anode including a carbonaceous material, a first electrolyte salt and a first organic solvent; and a slurry cathode including a conductor, a second electrolyte salt, a second organic solvent and a lithium transition metal oxide, with the proviso that neither the slurry anode nor the slurry cathode contain a binder.

5837401**ADDITIVES FOR LUBRICATING AGENTS
USED IN THE LAMINATION OF LITHIUM
SHEETS INTO THIN FILMS**

Gauthier Michel; Bouchard Patrick; Guerin Paul-Emile;
Armand Michel La Prairie, CANADA assigned to
Hydro-Quebec

Additives are represented by the following general formula: (*See Patent for Tabular Presentation*) PS in which L designates a hydrocarbon radical which serves as lubricating segment; S designates an oligomer segment which serves as solvating segment of metallic salts and Y designates a chemical bond which joins the hydrocarbon radical and the oligomer segment. With these additives there is no more need to subsequently wash the surface of laminated lithium.

NICKEL METAL HYDRIDE BATTERIES**5827494****PROCESS FOR PRODUCING
NON-SINTERED NICKEL ELECTRODE
FOR ALKALINE BATTERY**

Yano Mutsumi; Nogami Mitsuzo; Shinyama Katsuhiko;
Chikano Yoshito; Nishio Koji; Saito Toshihiko Osaka,
JAPAN assigned to Sanyo Electric Co Ltd

An non-sintered nickel electrode of alkaline batteries uses an active material powder which comprises composite particles comprising nickel hydroxide particles or solid solution particles consisting essentially of nickel hydroxide the surface of which is covered with a mixed crystal of cobalt hydroxide and the hydroxide of at least one metal (M) selected from the group consisting of aluminum, magnesium, indium and zinc. With this electrode, the cobalt hydroxide, which covers as a component of the mixed crystal the surface of the nickel hydroxide particles, minimally diffuses into them. Alkaline batteries using this electrode as positive electrode can therefore maintain, for a long period of time of charge-discharge cycles, the function of the cobalt hydroxide of increasing the conductivity of the electrode, thereby suppressing decrease in the discharge capacity in the course of charge-discharge cycles.

COMPONENTS AND/OR CHARGERS**5831412****SYSTEM FOR EXECUTING CHARGE
CONTROL OF A SECONDARY BATTERY
AND DETECTING THE CAPACITANCE
THEREOF**

Morioka Shizuo; Hosoya Nobuyuki; Ukiya Yoshiaki;
Ozawa Katsuo; Tanaka Masayasu Hanno, JAPAN
assigned to Kabushiki Kaisha Toshiba

A system comprises a rechargeable battery charged with a constant voltage and a charger. The battery includes a storage unit storing identification data and control voltage data and the charger is assigned identification data. The charger reads the identification data from the storage unit and charges the battery in accordance with the control voltage data, if the stored identification data coincides with the assigned charger identification data. If the stored identification data does not coincide with the assigned charger identification data, the charger gradually increases a charge voltage while detecting overvoltage of the battery, calculates a control voltage of the charger, and charges the battery in accordance with the calculated control voltage.

5834923**BATTERY CHARGE CONTROL METHOD**

Lewin Andrew Wayne; Tandler John J Manassas, VA,
UNITED STATES assigned to Orbital Sciences
Corporation

A battery charge control method which relies upon the relationship between the battery state of charge and the charge efficiency. The battery charging efficiency is estimated by computing the amount of charge received by the battery as a function of input charge. Thermodynamic calculations are used to obtain an estimate of battery charge levels over a wide range of temperatures, and two stage filtering is used to obtain a useful slope from noisy charge level signals to determine charging efficiency and ultimately control the charge rate. The method is especially useful for recharging nickel-hydrogen batteries used aboard spacecraft. The battery charge in such a battery is estimated by computing the number of moles of hydrogen gas in a cell. The input charge is the integral of the charge current. Thus, the charge efficiency is proportional to the rate of change of the number of moles of gas with

respect to the input charge. The method allows the charging to be controlled so as to charge the battery fully without overcharging, independent of the battery capacity, thus insuring full recharge, prolonging battery life and increasing efficiency.

5838142

BATTERY CHARGER AND A PROCESS FOR AUTOMATIC ADJUSTING OPERATION OF A BATTERY CHARGER

Wyss Patrick; Fessler Anton; Meyer Christian Starrkiach, SWITZERLAND assigned to Impex Patrick Wyss

The charging voltage UL of the battery being charged is sensed and amplified by an amplification factor. The amplification factor is determined by the sensed charging voltage. This provides automatic scaling of the charging voltage. The amplification factor K can be repetitively or continuously adjusted during battery charging. The time behavior of the input signal is monitored. The monitoring unit determines whether the time behavior of the input signal fulfills predetermined or given criteria. When a criterion is met, a check-result signal is generated, which controls charging, for example, by stopping charging when the time behavior indicates charging is completed. Time behavior is monitored by monitoring a second order time derivative of the input signal. The monitoring unit performs optimally within a certain magnitude range. Therefore, the amplification factor is adjusted to set the input signal at a magnitude within that range.

OTHER BATTERIES

5830601

RECHARGEABLE ELECTROCHEMICAL CELL WITH MODIFIED ELECTROLYTE

Lian Ke Keryn; Wu Ha; Li Changming Northbrook, IL, UNITED STATES assigned to Motorola Inc

An electrochemical battery cell including a zinc electrode, and may be fabricated with an electrolyte system including an electrolyte active species and a

modifier. The electrolyte active species is typically a metal hydroxide such as KOH or NaOH, while the modifier may be a porphine such as a metal porphine, and/or a polymeric material. The polymeric material may be, for example, a polyvinyl resin such as polyvinyl alcohol or polyvinyl acetate. The resulting electrolyte typically includes between 3 and 10 weight percent of the polyvinyl resin, 5 and 50 weight percent of the metal hydroxide, and between 1 PPM and 1 wt % of the modifier. Employing such an electrolyte in a cell including a zinc electrode results in an energy storage device having improved power density and substantially longer cycle life.

5834923

BATTERY CHARGE CONTROL METHOD

Lewin Andrew Wayne; Tandler John J Manassas, VA, UNITED STATES assigned to Orbital Sciences Corporation

A battery charge control method which relies upon the relationship between the battery state of charge and the charge efficiency. The battery charging efficiency is estimated by computing the amount of charge received by the battery as a function of input charge. Thermodynamic calculations are used to obtain an estimate of battery charge levels over a wide range of temperatures, and two stage filtering is used to obtain a useful slope from noisy charge level signals to determine charging efficiency and ultimately control the charge rate. The method is especially useful for recharging nickel-hydrogen batteries used aboard spacecraft. The battery charge in such a battery is estimated by computing the number of moles of hydrogen gas in a cell. The input charge is the integral of the charge current. Thus, the charge efficiency is proportional to the rate of change of the number of moles of gas with respect to the input charge. The method allows the charging to be controlled so as to charge the battery fully without overcharging, independent of the battery capacity, thus insuring full recharge, prolonging battery life and increasing efficiency.



REEDFAX Document Delivery System
*A service of Reed Technology and Information
Services Inc.*
275 Gibraltar Road, Horsham
PA 19044, USA

Phone: 1 800-422-1337
Fax: 1 800-421 5585

International Numbers:
Phone: 1 215-441-4768
Fax: 1 215-441-5463

REEDFAX™ Document Delivery System

We can begin fax transmission of patents **within 15 minutes — 24 hours a day — 7 days a week.**

We have over 1.9 million patents (1971 forward) and EP and PCT applications on our automated REEDFAX™ Document Delivery System which allows you to use a touchtone phone to order these patents without being limited to business hours

You can now get the patents you need **before hours...after hours...over the weekend...on holidays...even when the US PTO is closed because of inclement weather!.**

In addition to the patents on our automated system, we are able to deliver **all U.S. patents** beginning with #1 to the current week of issue. Patents not on our automated system are delivered from our second location with fax transmission beginning about 1½ hours, Monday-Friday, 8:30am–7:00pm ET. (13.00pm–24.00GMT).

We have no hidden charges at REEDFAX: no sign-on fees, no monthly fees and no minimum charges. You pay only for each patent delivered. Whatever your patent needs are - U.S. or foreign patents, file histories/wrappers, printed or faxed — we can fulfill them easily and promptly.

P.S. To experience your incredibly fast service, complete and return the FAXForm and we will provide your **FIRST FIVE U.S. PATENTS ABSOLUTELY FREE** (*you pay only for the cost of delivery!*)

 A member of the Reed Elsevier plc group