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LEAD ACID**5866274****MULTIPLE BATTERY COMPRISING A
CRANKING BATTERY AND AN
AUXILIARY BATTERY**

Mawston Ian Gran; Waugh Iain Wallace Auckland, NEW ZEALAND assigned to GloryWin International Group Ltd

Batteries for boats and vehicles require a CRA (cranking) battery 23 and an AUX (auxiliaries) battery 22 to ensure a start. The preferred version has an AUX battery made of parallel plates and a CRA battery made of parallel plates lying in a monobloc case in face to face positions. Each battery has a pair of CRA terminals 20, 30 for the electric starter and a pair of AUX terminals 19, 31 for the AUX loads of the vehicle and the alternator. The AUX and CRA negative are joinable by a link or a switch 41 so that a single earth connection is made to the vehicle. Alternatives show the AUX and CRA batteries side by side, at 90 degrees, providing 24 v or 36 v with a 12 v tap; a CRA battery with two AUX batteries one 51 for constant voltage equipment. Advant-ageous disposition of terminals simplifies connections to vehicle wiring and to a like battery.

5871862**BATTERY PASTE COMPOSITIONS AND
ELECTROCHEMICAL CELLS FOR USE
THEREWITH**

Olson John B Boulder, CO, UNITED STATES assigned to Optima Batteries Inc

An improved battery paste composition and a lead-acid electrochemical cell which incorporates the composition. The cell includes a positive current collector and a negative current collector which are each coated with a paste containing one or more lead-containing compositions and a paste vehicle to form a positive plate and a negative plate. An absorbent electrolyte-containing separator member may also be positioned between the positive and negative plates. The paste on the positive current collector, the negative current collector, or both further includes a special additive consisting of polyvinylsulfonic acid or salts thereof which provides many benefits including improved battery cycle life, increased charge capacity, and enhanced overall stability. The additive also makes the pastes smoother and more adhesive, thereby improving the paste application process. The paste compositions of interest may be used in conventional flat-plate cells or in spirally wound batteries with equal effectiveness.

5874186**LEAD-ACID CELLS AND BATTERIES**

Rao Purushothama; Uhlemann Thomas F Aurora, IL, UNITED STATES assigned to GNB Technologies Inc

A lead-acid cell or battery includes positive plates made from a lead-based alloy containing calcium, tin, and silver in amounts selected based upon the type of application and the plate fabrication method utilized, starting, lighting and ignition battery grids being directly cast and having calcium present in an amount of 0.03% to 0.050%, tin in an amount of 0.65% to 1.25%, and silver in an amount of from 0.018% to 0.030%, and the grids used in sealed, lead-acid cells comprising, when made by gravity casting, from about 0.035% to 0.055% calcium, 0.95% to 1.45% tin, and 0.018% to 0.030% silver, and, when made by continuous strip casting, calcium in the range of from 0.030% to 0.050%, tin in the range of from 0.95% to 1.25%, and silver in the range of from 0.017% to 0.030%, all of the alloy percentages being based upon the total weight of the grid.

5876873**SEALED LEAD-ACID CELLS AND
BATTERIES HAVING INTERNAL AND
EXTERNAL RESTRAINT FOR
ACCOMMODATING PLATE GROWTH**

Mattan Edward M St Charles, IL, UNITED STATES assigned to GNB Technologies Inc

Sealed lead-acid cells are disclosed which include an internal cell restraint contacting the interior surface of the cover and positioned between the positive plates and the cover, the internal cell restraint cooperates with an external cell restraint, such as a coated metal face plate, to direct positive plate growth which occurs in service away from the cover, the features disclosed allowing plastic-to-terminal post-cover seals to be used and allow cells of capacities of up to 2,000 Ampere Hours or more to be provided.

FUEL CELL**5869201****HYDROPHILIC, GRAPHITE FUEL CELL
ELECTRODE FOR USE WITH AN
IONOMER MEMBRANE**

Marchetti George A Western Springs, IL, UNITED STATES assigned to Marchetti George

The present invention includes a gas-permeable, hydrophilic, graphite fuel cell electrode for use in conjunction with an ionomer membrane. The fuel cell electrode includes a first graphite portion enclosing micropores and mesopores, terminating in a first surface for contacting fuel

or oxidant. The electrode also includes a second graphite portion enclosing micropores, adjacent and integral to the first portion. The second portion terminates in a second surface, opposing the first surface, for contacting fuel or oxidant. The electrode also includes a catalyst layer which is deposited onto the second surface.

5869202

**HYDROPHILIC GRAPHITE FUEL CELL
ELECTRODE FOR USE WITH AN
IONOMER MEMBRANE FUEL CELL**

Marchetti George A West Spring, IL, UNITED STATES assigned to Marchetti George A

The present invention includes a gas-permeable, hydrophilic, graphite fuel cell electrode for use in conjunction with an ionomer membrane. The fuel cell electrode includes a roughened, interstitial graphite surface enclosing micropores, upon which is deposited a catalyst for contacting an ionomer membrane. The graphite electrode has a thickness of about 40 microns.

5869203

**ELECTROLYTE MATRIX FOR MOLTEN
CARBONATE FUEL CELLS**

Huang Chao M; Yuh Chao-Y Danbury, CT, UNITED STATES assigned to Energy Research Corporation

A matrix for a carbonate electrolyte including a support material and an additive constituent having a relatively low melting temperature and a relatively high coefficient of thermal expansion. The additive constituent is from 3 to 45 weight percent of the matrix and is formed from raw particles whose diameter is in a range of 0.1 μm to 20 μm and whose aspect ratio is in a range of 1 to 50. High energy intensive milling is used to mix the support material and additive constituent during matrix formation. Also disclosed is the use of a further additive constituent comprising an alkaline earth containing material. The further additive is mixed with the support material using high energy intensive milling.

5871552

**PROCESS OF PREPARING ELECTRODE
FOR SOLID POLYMER ELECTROLYTE
FUEL CELL**

Tada Tomoyuk Kanagawa, JAPAN assigned to Tanaka Kikinzoku Kogyo K K; Masahiro WatanabeStonehart Associates Inc

Disclosed is a process of preparing an electrode for a solid polymer electrolyte fuel cell which comprises applying a suspension liquid containing a catalyst and ion exchange resin or a catalyst, Ion exchange resin and hydrophobic resin to an electrode substrate, and forming a catalyst layer

by drying, sintering the substrate under pressure characterized in that a high boiling point solvent which cannot be removed during the drying procedure is added to the suspension liquid. In this process, the high boiling point solvent such as glycerin and n-butanol which is not removed during the drying step is present in the pressurizing and sintering steps so that the situation of the catalyst layer is maintained constant scarcely influenced by the conditions of the said steps. The above solvent imparts pertinent softness to the ion exchange resin so as not to fill the pores for gas diffusion in the catalyst layer and to sufficiently bond the pieces of the ion exchange having the role of conducting H^+ conduction to obtain the electrode having the excellent electrode characteristics.

5871860

MANUFACTURE OF ELECTRODES

Frost Jonathan C; Gascoyne John M; Hards Graham A; Wilkinson David P; Prater Keith Peppard Common, UNITED KINGDOM assigned to Johnson Matthey Public Limited Company

An electrode suitable for use in fuel cells, for example in solid polymer fuel cells, comprises a non-uniform electrode layer and has improved electrochemical performance.

5874182

**METHOD AND APPARATUS FOR
REDUCING REACTANT CROSSOVER IN
A LIQUID FEED ELECTROCHEMICAL
FUEL CELL**

Wilkinson David P; Johnson Mark C; Colbow Kevin M; Campbell Stephen A North Vancouver, CANADA assigned to Ballard Power Systems Inc

In an electrochemical fuel cell, a sufficient quantity of catalyst, effective for promoting the reaction of reactant supplied to an electrode, is disposed within the volume of the electrode so that a reactant introduced at a first major surface of the electrode is substantially completely reacted upon contacting the second major surface. Crossover of reactant from one electrode to the other electrode through the electrolyte in an electrochemical fuel cell is thereby reduced.

5874183

**MOLTEN CARBONATE FUEL CELL AND
POWER GENERATION SYSTEM
INCLUDING THE SAME**

Uematsu Hiroyosh Yokohama, JAPAN assigned to Ishikawajima-Harima Heavy Industries Company Ltd

The molten carbonate fuel cell includes (a) an anode current collector formed to be flat rectangular tubular and having a pair of outer surfaces each formed at the center

thereof with a recessed portion for receiving an anode therein, the recessed portion being formed with a plurality of holes through which anode gas is supplied to anode from inside of the anode current collector, (b) a pair of cells each disposed on each of the outer surfaces of the anode current collector, and (c) a pair of cathode current collectors each cooperating with the anode current collector to sandwich each of the cells, therebetween, the cathode current collectors being formed with a plurality of holes through which cathode gas is supplied to cathode from outside of the cathode current collector. The anode current collector, the cells and the cathode current collectors constitute a pair of independent parallel cells. The anode current collector includes an anode gas passage which is connected to the anode current collector and through which an anode gas is to be provided to the inside of the anode current collector, and an anode current terminal formed at an end of the anode current collector perpendicular to the anode gas flow. Each of the cells includes an anode set in the recessed portion of the anode current collector, an electrolyte plate disposed in contact with an outer surface of the anode and extensive over the recessed portion of the anode current collector, and a cathode disposed in contact with an outer surface of the electrolyte plate. The cathode current collectors is connected to each other at ends disposed opposite to the anode current terminal to form shape, and the cathode current collector is formed at a connection point as a cathode current terminal. The above mentioned molten carbonate fuel cell makes it no longer necessary to use a separator for mechanically separating anode and cathode gases, resulting in remarkable cost down.

BATTERY MATERIALS

5865859

METHOD OF FORMING BATTERIES WITH PRINTED CATHODE LAYERS

Lake Rickie C Eagle, ID, UNITED STATES assigned to Micron Communications Inc

In one aspect, a method of making a battery includes fusing an alkali metal onto a patterned conductive layer. In another aspect, a method of forming a battery includes: a) providing a cathode base which comprises: a first nonconductive surface; a first conductive layer superjacent the first nonconductive surface; the first conductive layer comprising a first area; and a cathode layer superjacent the first conductive layer leaving at least a portion of the first area exposed; b) providing an anode base which comprises: a second nonconductive surface; a second conductive layer superjacent the first nonconductive surface, the second conductive layer comprising a second area; and an anode layer superjacent the second conductive layer leaving at least a portion of the second area exposed, the anode layer comprising an alkali metal; and c) aligning and coupling

the anode layer of the anode base with the cathode layer of the cathode base, wherein the aligning and coupling leaves at least a portion of the first area and at least a portion of the second area exposed for electrical connection. The invention also encompasses batteries formed by such methods.

5866278

ELECTROLYTIC MANGANESE DIOXIDE, PROCESS FOR PREPARING THE SAME, AND MANGANESE DRY CELL

Sumida Hirosh; Inoue Takuya; Enomoto Kiyoteru; Murakami Hajime; Inui Michiko; Sakurai Yoshihiro Takehara, JAPAN assigned to Mitsui Mining and Smelting Company Ltd; Matsushita Electric

An electrolytic manganese dioxide having a composition of MnO_x , wherein X is 1.90 to 1.96, an adhesive moisture content of not less than 1.5% by weight as measured according to the procedure specified in JIS, and a content of bound water, eliminative in the temperature range of 120° to 400°C, of not less than 3.0% by weight as measured by gravimetry, a process for preparing the same, and a manganese dry cell comprising a cathode mix comprised of a mixing of the electrolytic manganese dioxide with a conductive acetylene black, preferably a conductive acetylene black having a BET specific surface area of 70 to 2.50 m²/g, and an electrolyte composed mainly of zinc chloride and/or ammonium chloride. In the process of preparing the electrolytic manganese dioxide, after electrolysis and during or after neutralization, the manganese dioxide is heated in an aqueous solution at 50° to 100°C for 12 to 48 hours in the presence of an alkaline ammonium compound.

5869416

ELECTRODE INK FOR MEMBRANE ELECTRODE ASSEMBLY

Mussell Robert D Midland, MI, UNITED STATES assigned to The Dow Chemical Company

A composition comprising (a) catalytically-active particles, (b) an organic compound having a pKa of at least about 18 and a basicity parameter, beta, of less than 0.66, and (c) a polymeric binder. Also described is a process for preparing a membrane/electrode assembly, which comprises the sequential steps of (i) applying a layer of the composition of the invention to a solid polymer electrolyte, a carbon fiber paper, or a release substrate; (ii) heating the composition under conditions sufficient to volatilize at least 95 percent of component (b); and (iii) positioning the composition in contact with the solid polymer electrolyte, if the composition was not applied directly to the solid polymer electrolyte, forming the membrane/electrode assembly thereby. It has been discovered that the composition and

process of the invention, when used to prepare a membrane electrode assembly (MEA) having a solid polymer electrolyte, provides an MEA which provides a relatively high voltage at a given current density and gas flow rate in a fuel cell.

5871866

**LITHIUM-CONTAINING PHOSPHATES,
METHOD OF PREPARATION, AND USE
THEREOF**

Barker Jeremy; Saidi M Yazid Henderson, NV, UNITED STATES assigned to Valence Technology Inc

The invention provides an electrochemical cell which comprises a first electrode and a second electrode which is a counter electrode to said first electrode. The first electrode comprises a phosphorous compound of the general formula, $\text{Li}_3\text{M}'\text{M}''(\text{PO}_4)_3$. M' and M'' are the same or different from one another. Where M' and E'' are the same, they are metals having more than one oxidation state. Where M' and M'' are different from one another, they are selected from the group of metals where at least one of M' and M'' has more than one oxidation state.

5874184

**SOLID POLYMER ELECTROLYTE,
BATTERY AND SOLID-STATE ELECTRIC
DOUBLE LAYER CAPACITOR USING
THE SAME AS WELL AS PROCESSES
FOR THE MANUFACTURE THEREOF**

Takeuchi Masatak; Tokita Koji; Ueda Miyuki; Noguchi Jun; Yashima Hideo; Tamura Eri; Ooga Kazuhiko Chiba, JAPAN assigned to Showa Denko K K

A solid polymer electrolyte comprising a composite of (a) a polymeric component which comprises (i) a polymer obtained from at least one compound represented by general formula (IA), (IIA) and/or (IIIA) as described in the specification; or (ii) a polymer obtained from at least one compound having alcoholic hydroxyl groups wherein at least one hydrogen atom of said alcoholic hydroxyl groups is replaced by a unit represented by general formula (X) or (XI) as described in the specification, and (b) at least one electrolyte salt, which has a high ionic conductivity and can be made into a thin film. The present invention is also directed to an electrode comprising the solid polymer electrolyte and an electroactive substance or polarizable material; as well as a process for manufacturing the same. In addition, the present invention is directed to a primary an secondary battery having the solid polymer electrolyte, as well as a process for manufacturing the same. The battery of the present invention has a high capacity, high current density, and, in the case of a secondary battery, has good cyclability. Finally, the present invention is directed

to a solid-state electric double layer capacitor comprising the solid polymer electrolyte, as well as a process for manufacturing the same. The electric double layer capacitor has a high output voltage and a large take-out current.

LITHIUM BATTERIES

5866279

**NONAQUEOUS ELECTROLYTE
SECONDARY CELL**

Wada Hiroshi; Shizuka Kenji Yokohama, JAPAN assigned to Mitsubishi Chemical Corporation

A nonaqueous electrolyte secondary cell, wherein a lithium-containing metal oxide capable of binding and releasing lithium is used as a positive electrode, and a nonaqueous electrolyte containing a lithium salt is used as an electrolyte, in which a spinel type lithium manganese oxide which satisfies the formula: (*See Patent for Tabular Presentation*) PS wherein $0 < \text{or} = x < \text{or} = 0.05$, and $-0.025 < \text{or} = \text{delta} < \text{or} = 0.050$, and wherein the average valency of Mn is within a range of from 3.501 to 3.535, is used as the lithium-containing metal oxide.

5869207

**STABILIZED ELECTROCHEMICAL
CELL**

Saidi M Yazid; Scordilis-Kelley Chariclea; Barker Jeremy Henderson, NV, UNITED STATES assigned to Valence Technology Inc

The present invention provides a novel composition and method for preventing decomposition of one or more electrochemical cell components comprising an electrode having an active material, and an electrolyte. The method of the invention, for the first time, effectively overcomes problems which arise between the interaction of cell components and contaminate water retained in a cell. Such contaminate water reacts with the electrolyte which comprises a salt of lithium in a solvent. Solubilizing of the salt in solution with attendant interaction between the salt and water causes formation of hydrogen-containing acids. The method of the invention effectively blocks decomposition of a lithium metal oxide cathode active material, and particularly lithium manganese oxide (LMO, nominally LiMn_2O_4). Such decomposition is prevented by including in the cell a basic compound which forms an electron donor species in the electrolyte solution; and by neutralizing at least a portion of the acid by reacting the donor species with the hydrogen-containing acids thereby preventing decomposition of the lithium manganese oxide by the acid. The preservation of the lithium manganese oxide prevents degradation of other cell components by other mechanism.

5869208**LITHIUM ION SECONDARY BATTERY**

Miyasaka Tsutomu Kanagawa, JAPAN assigned to Fuji Photo Film Company Ltd

In a lithium ion secondary battery having a positive electrode, a negative electrode, a non-aqueous electrolyte, and a container, the positive electrode is made of a positive electrode active material having a spinel structure and the formula: (*See Patent for Tabular Presentation*) PS wherein M is cation of a metal other than Li and Mn; x, a and b are $0.1 < x < \text{or} = 1.2$, $0 < \text{or} = a < 2.0$ (preferably $0 < a < 2.0$), $1 < \text{or} = c < \text{or} = 3$, and $0 < \text{or} = b < 0.3$, during its charge-discharge cycle; the positive electrode is coated with a non-electron conductive protective layer; and the negative electrode is made of a negative electrode active material of a lithium alloy or an alloy into which a lithium ion can be intercalated.

5871861**LITHIUM ION SECONDARY CELL**

Hirokou Nobuyoshi; Kobayashi Yuukichi; Kaneko Isao; Inoue Minoru; Koyama Tomikazu Tokyo, JAPAN assigned to Mitsubishi Chemical Corporation

A lithium ion secondary cell comprises a plurality of single cells composed of a collector comprising positive electrodes composed of a metallic material coated with a positive electrode active substance; negative electrodes composed of a metallic material coated with a negative electrode active substance; separators interposed between the positive and negative electrodes; lugs of the metallic materials where the active substance is not coated; and conductors adapted to bunch and clamp the lugs of the positive and negative electrodes separately, the positive and negative electrodes being assembled in laminate alternatively, and the ends of the lugs of the positive and negative electrodes being welded to the respective conductors separately so that electric current can be taken out through the conductors.

5871863**LITHIUM ION SECONDARY BATTERY**

Miyasaka Tsutomu Kanagawa, JAPAN assigned to Fuji Photo Film Company Ltd

In a lithium ion secondary battery having a positive electrode, a negative electrode, non-aqueous electrolyte, and a container sealing the electrodes and electrolyte therein, the positive electrode is formed of a positive electrode active material which is produced by electrochemically intercalating lithium ions into lithium manganese oxide in the container to give a positive electrode active material precursor comprising lithium manganese oxide of which lithium ion contents are increased, and then releasing lithium ions from the positive electrode active material

precursor in the container, and the negative electrode is formed of a negative electrode active material which is produced by intercalating the released lithium ions into a negative electrode active material precursor of a metal oxide in the container.

5871864**LITHIUM SECONDARY CELLS AND METHODS FOR PREPARING ACTIVE MATERIALS FOR NEGATIVE ELECTRODES**

Kobayashi Yuukichi; Ohara Hidehiko; Watanabe Kenji; Niwa Kazuo Tokyo, JAPAN assigned to Mitsubishi Chemical Corporation

A lithium secondary cell wherein a carbon material treated with a fluorinating agent and having substantially no C-F covalent bond, is used as an active material for negative electrode, provides a secondary cell having improved cell life. Further, a lithium secondary cell wherein a carbon material treated with a fluorinating agent and having an amount of fluorine extractable with an aqueous alkaline solution being at most 0.05 wt%, is used as an active material for negative electrode, or a lithium secondary cell wherein a carbon material treated with a fluorinating agent and containing lithium, is used as an active material for negative electrode, provides a secondary cell which is free from a problem of expansion of the casing during charging due to fluorine remaining in a small amount in the cell.

5871865**METHODS OF FABRICATING ELECTROCHEMICAL CELLS**

Barker Jeremy; Cochran Steven Henderson, NV, UNITED STATES assigned to Valence Technology Inc

Conditioning secondary lithium ion cells at elevated temperatures above ambient reduces the time required to complete this process and produces cells and batteries which demonstrate improved electrochemical performance. Conditioning includes subjecting an electrochemical cell to at least one full charge/discharge cycle whereby gases generated and removed before the cell is sealed and ready for use.

5874058**METHOD OF PREPARING $\text{Li}_1 + \text{xMn}_2 - \text{xO}_4$ FOR USE AS SECONDARY BATTERY ELECTRODE**

Sheargold Stephen; Andersen Terrell Edmond, OK, UNITED STATES assigned to Kerr-McGee Chemical LLC

A continuous method of preparing a single phase lithiated manganese oxide intercalation compound of the formula $\text{Li}_1 + \text{xMn}_2 - \text{xO}_4$ comprising the steps of: mixing intimately a lithium hydroxide or a lithium salt and a man-

ganese oxide or a manganese salt; feeding the intimately mixed salts to a reactor; continuously agitating the mixed salts in the reactor; heating the agitated mixed salts in the reactor at a temperature of from about 650°C to about 800°C for a time not in excess of about 4 hours in an oxygen-containing atmosphere; and cooling the reacted product to less than about 200°C in an oxygen-containing atmosphere for a time not in excess of about 2 hours.

5874185

**POLYMER ELECTROLYTE MATERIAL
FOR USE IN LITHIUM AND LITHIUM ION
BATTERIES**

Wang Yung-Yun; Wan Chi-Chao; Sung Hsi-Yueh Taipei, CHINA (TAIWAN) assigned to Industrial Technology Research Institute

A polymer electrolyte for use in lithium batteries is disclosed. It contains: (a) a poly(vinyl chloride-co-vinyl acetate), or PVCAC, which is a copolymer containing 5 to 25 mol% of a vinyl chloride monomer, and 75 to 95 mol% of a vinyl acetate monomer; (b) a lithium salt; and (c) an organic solvent mixture. The organic solvent mixture contains at least one component selected from the group consisting of EC and PC and a high-boiling-point organic solvent. Preferably, the amount of the PVCAC is about 16–40 mol% of the polymer electrolyte, lithium about 3–12 mol%, and the organic solvent mixture about 48–81 mol%, when the polymer electrolyte was freshly prepared. Preferably, the high-boiling-point is DMF or NMP. Within the organic solvent mixture, if DMF is used, it should preferably be about 20–60 mol% of the total organic solvent mixture. If NMP is used, it should preferably be about 10–40 mol% of the total organic solvent mixture.

NICKEL METAL HYDRIDE BATTERIES

5874824

**METHOD OF ACTIVATION TREATMENT
OF NI/MH SECONDARY BATTERY BY
HOT-CHARGING**

Lee Jai-Young; Kim Dong-Myun; Lee Ki-Young; Jung Jae-Han; Yu Ji-Sang; Lee Han-Ho Taejon, REPUBLIC OF KOREA assigned to Korea Advanced Institute of Science and Technology

The present invention provides a method of activation treatment of a Ni/MH secondary battery which comprises a step of immersing an electrode or battery in a solution or electrolyte and charging/discharging concurrently. In accordance with the activation treatment of a Ni/MH secondary battery by hot-charging method of the invention, the time required for activation treatment is remarkably saved and the activation process is carried out in a highly efficient manner, compared to the conventional methods of activation treatment.

5876871

**NICKEL-HYDROGEN BATTERY CELL,
AND NICKEL-HYDROGEN BATTERY
COMPRISING A PLURALITY OF
NICKEL-HYDROGEN BATTERY CELLS**

Takizawa Yoshihiro Tokyo, JAPAN assigned to Kabushiki Kaisha Toshiba

A nickel-hydrogen battery cell is provided with a pressure vessel made up of upper and lower vessel elements. The lower vessel element has a flange section on the outer wall thereof. A coil heater is attached to the flange section. The temperature of the pressure vessel is controlled by heating the flange section by means of the coil heater. The pressure vessel is assembled with reference to a fixing plate by coupling the flange section to the surface of the fixing plate.

5876874

**NICKEL ELECTRODE FOR
SECONDARY BATTERY**

Furukawa Ju Fukushima, JAPAN assigned to Furukawa Denchi Kabushiki Kaisha

Disclosed is a nickel electrode for secondary battery, which ensures high packing density of an active material and improvement in a efficiency factor of the active material. The nickel electrode comprises a current collector supporting an active mixture material containing Ni(OH)₂ powder and CoO powder and/or Co(OH)₂ powder as essential components, wherein said Co(OH)₂ powder and/or CoO powder are spherical or almost spherical in shape.

COMPONENTS AND / OR CHARGERS

5872444

**BATTERY CHARGING DEVICE METHOD
FOR CHARGING BATTERY PACK AND
BATTERY PACK**

Nagano Naoki; Koyama Toshio Tokyo, JAPAN assigned to Sony Corporation

There is disclosed a battery charging device for charging a battery pack having a battery cell, the battery pack being capable of storing an information for a maximum charging current and a maximum charging voltage of the battery cell and communicating the information with the battery charging device, which includes a communication means for receiving the information indicative of the maximum charging current and the information indicative of the maximum charging voltage of the battery cell which is transmitted from the battery pack, and a control means for controlling charging current and voltage upon charging so as not to exceed the maximum charging current and the maximum charging voltage of the battery cell. Further, in accordance with the present invention, there are disclosed

a method for charging the battery pack, and the battery pack capable of being mounted to various electronic apparatuses.

5874823

CONTROLLED BATTERY CHARGER FOR CHARGING MULTIPLE BATTERIES

Suzuki Keij Kanagawa ken, JAPAN assigned to International Business Machines Corporation

A controlled battery charger for appropriately executing trickle charging for an electronic apparatus incorporating more than two batteries even when output terminal voltages of the incorporated batteries differ. A battery charger of the present invention includes a trickle charging circuit serially inserted between the output terminals of the first and the second batteries. An example of the trickle charging circuit is constituted by the first zener diode whose cathode is connected to the output terminal of the first battery, and the second zener diode whose cathode is connected to the output terminal of the second battery and whose anode is connected to the anode of the first zener diode, i.e., is constituted by two zener diodes serially connected in opposing directions. A resistor may be serially inserted between the anodes of the first and the second zener diodes. When the gap between the output terminal voltages V_{bat1} and V_{bat2} of the first and the second batteries becomes larger than the first or the second zener voltage V_{z1} or V_{z2} , the trickle charging circuit enters the current-carrying state. For example, when the first battery is over-discharged and the gap between the output terminal voltages V_{bat1} and V_{bat2} is greater than the second zener voltage V_{z2} , the output terminals enter the current-carrying states, and a current flows from the second battery to the first battery until the gap of the voltage level is equal to or lower than the zener voltage V_{z2} . As a result, trickle charging for the first battery is performed by the second battery. The resistor inserted serially between the first and the second zener diodes controls the current volume that flows between the batteries in the current-carrying state into a microcurrent appropriate for trickle charging.

5876870

BATTERY RESIDUAL AMOUNT DISPLAY CIRCUIT

Kawabata Hisashi Tokyo, JAPAN assigned to NEC Corporation

At step S21, a residual amount judging section of a battery residual amount display circuit measures a battery voltage. If a mode transition is detected at step S22, the process returns to step S21 without executing the subsequent steps. If it is judged at step S23 that the operation mode is a reception-waiting mode, the process goes to step S24, where the battery amount judging section judges a battery residual amount by comparing the detected battery voltage with

threshold values. If the operation mode is judged to be a transmission mode, the battery residual amount judging section determines a voltage drop during a transmission at step S25, and converts the voltage drop into a battery voltage of a reception waiting mode at step S26 by subtracting the voltage drop from a battery voltage obtained in a reception waiting mode immediately before the mode transition. At step S27, the battery residual amount judging section determines a battery residual amount by comparing the converted battery voltage with the threshold values.

OTHER BATTERIES

5869200

MAGNETIC SLURRY FUELED BATTERY SYSTEM

Nunnally William C Columbia, MO, UNITED STATES assigned to SunSave Inc

A battery system and method of operation are shown. The battery system utilizes a microparticle fuel slurry containing microparticle spheres surrounded by active electrochemical material. In the operation of the battery system, the microparticle spheres are attracted to battery-cell electrode plates and held there by a magnetic field. The core of the microparticle spheres and battery-cell electrode plates may be permanently magnetic or ferromagnetic in nature. The magnetic field may originate from permanently magnetic materials or be induced using magnetic field windings or the like. The battery system may be recharged by replacing spent microparticle fuel slurry with unspent slurry. In some applications, such as when used to power an electro-motive vehicle, a reserve of unspent microparticle fuel slurry may be stored on-board the vehicle and used to periodically replace spent microparticle fuel slurry during operation. In such applications, when the on-board storage of unspent fuel slurry has been spent, the battery system may be refueled with a new supply of unspent fuel slurry without interrupting operation of the battery.

5869205

ELECTROCHEMICAL CELL HAVING MULTIPLE ANODE COMPARTMENTS

Mick Alvin R; Urry Lewis F Lorain, OH, UNITED STATES assigned to Eveready Battery Company Inc

An electrochemical cell is provided having a first electrode, such as a cathode, and a plurality of second electrodes, such as anodes, provided in a cell container. A plurality of cavities are formed within the cathode. A separator and anode are disposed within each of said cavities, and a current collector electrically connects the anodes together. According to one embodiment, a plurality of cylindrical anodes are provided. According to a second embodiment, a plurality of semi-cylindrical anodes are disclosed.

5876872
UNDERWATER RECHARGEABLE
BATTERY AND METHOD OF
MANUFACTURE

Feezor Michael D Chapel Hill, NC, UNITED STATES

The battery of the invention includes at least one electrochemical cell for use and recharging underwater, particularly seawater, at a pressure at or greater than atmospheric

pressure. The battery has an anode, a cathode, an associated electrolyte in a housing, and a pressure compensation fluid which has a density greater than water, but preferably between the density of water and the density of the electrolyte. Preferably the pressure compensation fluid has a density of about 1.2 g/cm³, and is non-conductive. Apparatus to compensate for changes in volume are provided, as are components for the escape of internally generated gases.