

5506078**METHOD OF FORMING A STABLE FORM OF LiMnO_2 AS CATHODE IN LITHIUM CELL**

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The invention disclosed relates to a new method of forming spinel-related $\lambda\text{-Li}_{2-x}\text{Mn}_2\text{O}_4$, wherein $0 < x < 2$, solely by electrochemical means with air-stable orthorhombic LiMnO_2 as the starting material. This spinel-related material is hygroscopic, metastable and is typically made by chemical means, followed by electrochemical conversion of spinel-type LiMn_2O_4 . Also disclosed are new secondary lithium ion electrochemical cells employing as initial active cathode material a compound of formula LiMnO_2 , having a specific orthorhombic crystal structure.

NICKEL METAL HYDRIDE BATTERIES**5500309****NI/METAL HYDRIDE ACCUMULATOR**

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The positive electrode of a Ni/metal hydride accumulator is formed from a mass mixture of Ni(OH)_2 and an oxidation-resistant graphite. The stable graphite is notable for a high degree of crystallinity and a low ash content. In conventional Ni/metal hydride accumulators, cobalt compounds play an essential part in developing a conductive matrix within their positive nickel hydroxide electrodes, leading to reductive destruction of the matrix by severe high temperature short circuit testing. In contrast, the same accumulators, with positive electrodes produced according to the present invention, survive the test with only a temporary and slight decline in capacity.

5501917**HYDROGEN STORAGE MATERIAL AND NICKEL HYDRIDE BATTERIES USING SAME**

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Improved multicomponent alloys for hydrogen storage and rechargeable hydride electrode applications, and in particular for rechargeable hydride battery applications, according to the formula: AaBbNicDyMxRz , and the hydride thereof, where A is at least one element selected from the group consisting of Ti, Zr, Hf, Y, V, Nb, Pd, Mg, Be, and Ca; B is at least one element selected from the group consisting of Mg, Al, V, Wb, Ta, Cr, Mn, Si, C, B, and Mo; D is at least one element selected from the group consisting of W, Fe, Co, Cu, Zn, Ag, Sb and Sn; M is at least one element selected from the group consisting of Li, Na, K, Rb, Cs, P, S, Sr, and Ba; R is at least one element selected from the group consisting of Sc, Y, La, Ce, Pr, and Yb; and where a, b, c, x, y and z are defined by: $0.10 < a < 0.85$, $0.02 < b < 0.85$, $0.02 < c < 0.85$, $0.01 < x < 0.30$, $0 < y < 0.25$, $0 < z < 0.12$ and $a+b+c+x+y=1.00$. In another aspect, this invention is directed to provide a rechargeable electrochemical cell (battery) using the improved hydrogen storage alloy given in the present invention.

5506069**ELECTROCHEMICAL HYDROGEN STORAGE ALLOYS AND BATTERIES FABRICATED FROM MG CONTAINING BASE ALLOYS**

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An electrochemical hydrogen storage material comprising: (*See Patent for Tabular Presentation*) PS where, Base Alloy is an alloy of Mg and Ni in a ratio of from about 1:2 to about 2:1, preferably 1:1; M represents at least one modifier element chosen from

the group consisting of Co, Mn, Al, Fe, Cu, Mo, W, Cr, V, Ti, Zr, Sn, Th, Si, Zn, Li, Cd, Na, Pb, La, Mm, and Ca; b is greater than 0.5, preferably 2.5, atomic percent and less than 30 atomic percent; and $a+b=100$ atomic percent. Preferably, the at least one modifier is chosen from the group consisting of Co, Mn, Al, Fe, and Cu and the total mass of the at least one modifier element is less than 25 atomic percent of the final composition. Most preferably, the total mass of said at least one modifier element is less than 20 atomic percent of the final composition.

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METAL HYDRIDE ELECTRODE, NICKEL ELECTRODE AND NICKEL-HYDROGEN BATTERY

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A metal hydride electrode, in which a metallic cobalt powder is mixed, within a mixing range of 3 to 20 weight percents, with a hydrogen absorbing alloy powder formed by substituting a part of Ni of alloy expressed by a rational formula of $MmNi_5$ with Al and at least one kind of Fe, Cu, Co, Mn, and the mixed powder is loaded in a porous alkaline-proof metal body. An nickel electrode, in which a cobalt monoxide powder is mixed with an active material powder within a mixing range of 5 to 15 weight percents, the active material powder comprising zinc existing within a range of 2 to 8 weight percents, under a solid solution state in a crystal of nickel hydroxide powder assuming a spherical shape including an inner pore volume of 0.14 ml/g or less, and the mixed powder is loaded in a porous alkaline-proof metal body. A nickel-hydrogen battery, in-which the foregoing metal hydride electrode and the foregoing nickel electrode are wound with a separator put between them, aqueous solution of potassium hydroxide is filled therein and sealed, and they are maintained under standing condition for 5 hours or more.

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METAL HYDRIDE ELECTRODE AND NICKEL-HYDROGEN ALKALINE STORAGE CELL

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A metal hydride electrode is mainly composed of a hydrogen-absorbing alloy and provided with carbon powder which is selected from acetylene black, carbon black, ketjen black, and active carbon. The metal hydride electrode is further provided with an additive including an oxide and/or a hydroxide of a metal having oxidation-reduction potential nobler than an operational potential of the hydrogen-absorbing alloy. The metal hydride electrode has excellent oxygen gas absorption ability and easy detection of ΔV , thereby realizing to produce a nickel-hydrogen alkaline storage cell with excellent charge/discharge cycle life.

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NICKEL HYDROXIDE ELECTRODE FOR USE IN AN ALKALINE SECONDARY BATTERY

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A nickel hydroxide electrode useful in an alkaline secondary battery containing at least one of a copper-based additive or a manganese-based additive in either a nickel hydrogen active material as applied to a porous metal substrate, in a porous metal substrate itself, or both. The copper-based additive is at least member of the group consisting of copper, cuprous oxide and cupric oxide. The manganese-based additive is at least member of the group consisting of metal manganese, MnO, Mn₂O₃, Mn₃O₄, MnO₂, MnO₃, Mn₂O₇, Mn(OH)₂, MnCO₃, K₂MnO₂, and KMnO₄. When the additive is used in a positive electrode for an alkaline secondary battery, the rate of absorption of