Silicon-carbon negative electrode battery technology patent

We have developed a method which is adaptable and straightforward for the production of a negative electrode material based on Si/carbon nanotube (Si/CNTs) composite for Li-ion batteries. Comparatively inexpensive silica and magnesium powder were used in typical hydrothermal method along with carbon nanotubes for the ...

4 · An AI model was defined for commercially relevant negative electrodes of Li-ion batteries (without Li metal electrodes). Patent documents were grouped into patent families and scored with the ...

Silicon is considered as one of the most promising candidates for the next generation negative electrode (negatrode) materials in lithium-ion batteries (LIBs) due to its high theoretical specific capacity, appropriate lithiation potential range, and fairly abundant resources. However, the practical application of silicon negatrodes is hampered by the ...

The combination of silicon and carbon materials which effectively relieve the volume expansion of silicon and improve the overall electrical conductivity is becoming one of the hot and widespread concern topics [18], [19], [20].At present, various processing techniques, such as spray drying [21], [22], [23], vapor deposition [24], [25], ball-milling ...

Thus, to address the critical need for higher energy density LiBs (>400 Wh kg -1 and >800 Wh L -1), 4 it necessitates the exploration and development of novel negative electrode materials that exhibit high capacity and low equilibrium operating potential. 5 Among alloy-type negative electrode materials, Silicon (Si) is presented as ...

Since the lithium-ion batteries consisting of the LiCoO 2-positive and carbon-negative electrodes were proposed and fabricated as power sources for mobile phones and laptop computers, several efforts have been done to increase rechargeable capacity. 1 The rechargeable capacity of lithium-ion batteries has doubled in the last 10 ...

A Thorough Analysis of Two Different Pre-Lithiation Techniques for Silicon/Carbon Negative Electrodes in Lithium Ion Batteries. Silicon (Si) is one of the most promising ...

The present invention compared with prior art; Lithium ion battery silicon-carbon cathode material is the composite material that is made up or combine through binding agent by high purify nano silica, chemical vapour deposition (CVD) coating, organic carbon source coating and natural graphite powder; This silicon-carbon composite cathode material reversible ...

As a consequence, the first reversible capacity and initial coulombic efficiency of the silicon/carbon composite are 936.4 mAh g -1 and 88.6% in half-cell and the full-cell 18650 cylindrical battery using our silicon/carbon

composite as anode exhibits a high capacity retention up to 80% after 680 cycles, indicating an excellent cycling ...

We demonstrate how the equations can be applied to aid in the design of electrodes by comparing silicon-graphite and tin-graphite composite negative electrodes as examples with practical relevance.

4 · Process in Figure U1 - A POWDER FOR USE IN THE NEGATIVE ELECTRODE OF A BATTERY, A METHOD FOR PREPARING SUCH A POWDER AND A BATTERY COMPRISING SUCH A ...

2.4 The utilization of lithium powder suspension prelithiation agent and the assembly of the battery. Firstly, the prepared negative electrode film was placed at the center of the negative electrode shell. Then, 0.05 mL of lithium powder suspension prelithiation agent was dropped onto the electrode film and left undisturbed for 5 min to ...

Without prelithiation, MWCNTs-Si/Gr negative electrode-based battery cell exhibits lower capacity within the first 50 cycles as compared to Super P-Si/Gr negative electrode-based full-cell. This could be due to the formation of an SEI layer and its associated high initial irreversible capacity and low ICE (Figure 3a, Table 2).

The present invention belongs to the technical field of lithium ion batteries, and particularly relates to a silicon-carbon negative electrode material for a lithium ion battery and a ...

Contemporary Amperex Technology has been granted a patent for a secondary battery and device. The battery includes a negative electrode plate with a silicon-based and carbon material, a separation film with a thickness of 7 µm~12 µm, and an electrolyte with ethylene carbonate.

The results demonstrate that PVDF-HFP-based GPE is well-suited to work with a negative electrode based on macroporous Si thanks to its ability to enlarge the ...

1 Introduction. Among the various Li storage materials, 1 silicon (Si) is considered as one of the most promising materials to be incorporated within negative electrodes (anodes) to increase the energy density of current lithium ion batteries (LIBs). Si has higher capacities than other Li storage metals, however, the incorporation of ...

and battery performance of the constructed Si/C-Gr ternary composite negative electrode material. Firstly, polyvinyl butyral (PVB)-based carbon-coated silicon (Si/C) compos-ite materials were prepared by polymer coated silicon and then high-temperature carbonization method. Based on it, a silicon based ternary composites of Si/C-Gr were further

Charging a lithium-ion battery full cell with Si as the negative electrode lead to the formation of metastable 2

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Li 15 Si 4; the specific charge density of crystalline Li 15 Si 4 is 3579 mAhg -1 ...

1 · SK Innovation has patented a lithium secondary battery negative electrode featuring a silicon-based active material that includes iron and aluminum. The ...

The present application provides a method for preparing silicon-carbon composite. The silicon-carbon composite prepared according to the present application is suitable to be an active material for negative electrode of lithium ion battery, which could not only ensure high capacity of silicon but also have good cycle performance and good charge and ...

However, with the expansion of the applications of the secondary battery, there is an increasing demand for higher capacity and higher output from a secondary battery. Accordingly, non-carbon negative electrode materials having a capacity of 500 mAh/g or greater (e.g. silicon (Si), tin (Sn), or aluminum (Al)), which can replace carbon ...

1. Introduction. The current state-of-the-art negative electrode technology of lithium-ion batteries (LIBs) is carbon-based (i.e., synthetic graphite and natural graphite) and represents >95% of the negative electrode market [1].Market demand is strongly acting on LIB manufacturers to increase the specific energy and reduce the ...

1 INTRODUCTION. Silicon is known as one of the best negative electrode candidates for Li-ion batteries (LIBs) applications. Its alloying with lithium may theoretically lead to specific capacities in LIB as high as 3580 mA h g -1 with the formation of Li 15 Si 4, the most lithiated phase electrochemically formed at room temperature.The relatively low potential ...

Negative electrode chemistry: from pure silicon to silicon-based and silicon-derivative Pure Si. The electrochemical reaction between Li 0 and elemental Si has been known since approximately the ...

EP4 287 311A1 3 5 10 15 20 25 30 35 40 45 50 55 where R1 has a carbon-carbon double bond or a carbon-carbon triple bond, and at least one of R2, R3, R4, R5, or R6 has an organic acid group; or R 1 is an organic acid group having a carbon-carbon double bond or a carbon-carbon triple bond. [0006] In a third aspect, a negative electrode is provided ...

1 · Introduction. Since their commercialization in the 1990s, lithium-ion battery (LIB) chemistries have had a high impact on our modern life, with currently growing markets ...

The invention discloses a silicon-carbon negative electrode material of a lithium ion battery and a preparation method thereof, and solves the technological problem of ...

Disclosed is a silicon-carbon composite for a negative active material of a lithium secondary battery, including

carbon nanofibers and silicon particles, wherein the silicon particles are coated with amorphous silica. In the silicon-carbon composite of the invention, silicon is provided in the form of a composite with carbon fibers and the surface of ...

Since the commercialization of lithium-ion secondary batteries (LIBs) carried out by Sony in 1991 [], LIBs have played increasingly important roles in the portable electronic device and electric vehicles.The present commercial negative electrode materials, like modified natural graphite or artificial graphite, cannot satisfy the ever ...

Silicon (Si) nanomaterials have emerged as a leading candidate for next generation lithium-ion battery anodes. However, the low electrical conductivity of Si requires the use of conductive additives in the anode film. Here we report a solution-based synthesis of Si nanowires with a conductive carbon skin. Without any conductive additive, the Si ...

The lithium ion battery silicon carbon composite negative electrode material prepared by the preparation method disclosed by the invention achieves the synergistic...