Preparation of negative electrode materials for lithium batteries using raw coke

"Lithium-based batteries" refers to Li ion and lithium metal batteries. The former employ graphite as the negative electrode 1, while the latter use lithium metal and potentially...

Recently, redox-active organic materials (ROMs), which are composed of elements such as C, O, N, and S, have emerged as a promising alternative to inorganic electrode materials owing to their abundance, light weight, and ...

With the rapid development of industry, the demand for lithium resources is increasing. Traditional methods such as precipitation usually take 1-2 years, and depend on weather conditions. In addition, electrochemical ...

Rechargeable solid-state batteries have long been considered an attractive power source for a wide variety of applications, and in particular, lithium-ion batteries are emerging as the technology ...

When used as negative electrode material, graphite exhibits good electrical conductivity, a high reversible lithium storage capacity, and a low charge/discharge potential. ...

Request PDF | Petroleum Coke As Active Material of Negative Electrode for Lithium-Sulfur Batteries | We studied the possibility of using graphite and petroleum coke as active materials of negative ...

In this work, the robust method to synthesize Si/Cu 3 Si-based composite as negative electrode materials for lithium ion battery is disclosed. Our results reveal that high energy mechanical ...

Silicon (Si) is one of the most promising candidates for application as high-capacity negative electrode (anode) material in lithium ion batteries (LIBs) due to its high specific capacity. ...

This review paper presents a comprehensive analysis of the electrode materials used for Li-ion batteries. Key electrode materials for Li-ion batteries have been explored and the associated challenges and advancements have been discussed. Through an extensive literature review, the current state of research and future developments related to Li-ion battery ...

In addition to the hydrocarbon component of the raw materials, the quality of the produced needle coke is affected by the inorganic part of the raw materials - heteroatoms and metals. The studies under [38], [39] consideration describe the negative effect of substances insoluble in quinoline on the formation of mesophase.

Empty Cell Anodes for high-energy Li-ion batteries Empty Cell Silicon Phosphorus (BP and RP) Very low lithiation operating voltage (~0.2-0.3V vs. Li + /Li)Low lithiation operating voltage (~0.7-0.8V vs. Li + /Li)Very high theoretical C sp of 4200 mAh g -1 (Li 22 Si 5) and 3579 mAh g -1 (Li 15 Si 4) ...

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Non-calcined petroleum coke can serve as an anode material for lithium-ion batteries (LIBs). Nevertheless, this method results in materials with insufficient conductivities and low ...

Among the potential metal-anode energy storage systems such as Na, K, Zn, Ca, etc., Mg metal anode exhibits unique features. As shown in Fig. 1, it owns almost twice the volumetric capacity of Li anode, a relatively low reduction potential (-2.37 V vs. SHE), and a rich natural abundance, which make it a promising anode for developing batteries with high energy ...

As demand for high-performance electric vehicles, portable electronic equipment, and energy storage devices increases rapidly, the development of lithium-ion batteries with higher ...

Abstract In this study, Needle and Regular coke, which has different crystalline and orientation characteristics, were graphitized, and the effect of crystal changes on electrochemical performance was investigated. The initial efficiency and capacity were mainly influenced by the shapes and specific surface areas of the particles, and the graphitized ...

Today"s lithium(Li)-ion batteries (LIBs) have been widely adopted as the power of choice for small electronic devices through to large power systems such as hybrid electric vehicles (HEVs) or electric vehicles ...

Abstract--The possibility of using carbon materials based on petroleum coke as the cheap and available active material for negative electrodes of lithium-sulfur rech argeable batteries is considered. The comparative stud-ies of characteristics of lithium-sulfur

Expanded graphite can also be used in the preparation of electrode materials for Li S batteries. Xu et al. fixed S inside EG by vapor deposition [88], in this way, the inherent oxygen-containing functional groups and carbon vacancies in EG can form chemicalFig. 9

Solid-state flexible supercapacitors (SCs) have many advantages of high specific capacitance, excellent flexibility, fast charging and discharging, high power density, environmental friendliness, high safety, light weight, ductility, and long cycle stability. They are the ideal choice for the development of flexible energy storage technology in the future, and ...

In the present study, biomass-based carbon was prepared by simple heat treatment from biowaste of the Nerium oleander flower. The scanning electron microscopy image depicts the porous-structure of biomass-derived carbon. The prepared bio-mass carbon delivers a surface area of 420.42 m2/g with mesoporous nature. The prepared material has been ...

Understanding the resulting raw materials of lithium batteries will help us better recycle and reuse discarded

lithium batteries. Lithium-ion battery raw materials are mainly composed of: positive electrode material, negative electrode material, separator, electrolyte.

Lithium-ion batteries are promising energy storage devices used in several sectors, such as transportation, electronic devices, energy, and industry. The anode is one of the main components of a lithium-ion battery that plays a vital role in the cycle and electrochemical performance of a lithium-ion battery, depending on the active material. Recently, SiO2 has ...

The possibility of using carbon materials based on petroleum coke as the cheap and available active material for negative electrodes of lithium-sulfur rechargeable batteries is considered. The comparative studies of characteristics of lithium-sulfur cells with negative electrodes based on metal lithium, graphite, and petroleum coke are carried out. It is found that ...

Intensive efforts aiming at the development of a sodium-ion battery (SIB) technology operating at room temperature and based on a concept analogy with the ubiquitous lithium-ion (LIB) have emerged in the last few years. 1-6 Such technology would base on the use of organic solvent based electrolytes (commonly mixtures of alkylcarbonates with a dissolved ...

Rechargeable solid-state batteries have long been considered an attractive power source for a wide variety of applications, and in particular, lithium-ion batteries are emerging as the...

This review gathers the main information related to the current state-of-the-art on high-energy density Li- and Na-ion battery anodes, from the main characteristics that make ...

Typically, a basic Li-ion cell (Figure 1) consists of a positive electrode (the cathode) and a negative electrode (the anode) in contact with an electrolyte containing Li-ions, which flow through a separator positioned between the two electrodes, collectively forming an integral part of the structure and function of the cell (Mosa and Aparicio, 2018).

Lithium-ion batteries (LIBs) have been broadly utilized in the field of portable electric equipment because of their incredible energy density and long cycling life. In order to overcome the capacity and rate bottlenecks of commercial graphite and further enhance the electrochemical performance of LIBs, it is vital to develop new electrode materials. Transition metal oxides (TMOs) have ...

Molten salt [29] typically refers to a liquid-phase ion melt obtained from single or multiple inorganic compounds, such as alkali metal or alkaline earth metal halides, carbonates, hydroxides, etc is a molten mixture composed of metal cations and non-metal anions.

Since the 1950s, lithium has been studied for batteries since the 1950s because of its high energy density. In

the earliest days, lithium metal was directly used as the anode of the battery, and materials such as manganese dioxide (MnO 2) and iron disulphide (FeS 2) were used as the cathode in this battery. ...

Abstract The possibility of using carbon materials based on petroleum coke as the cheap and available active material for negative electrodes of lithium-sulfur rechargeable batteries is considered. The comparative studies of characteristics of lithium-sulfur cells with negative electrodes based on metal lithium, graphite, and petroleum coke are carried out. It is ...

Vanadium-based materials like vanadates and vanadium oxides have become the preferred cathode materials for lithium-ion batteries, thanks to their high capacity and plentiful oxidation states (V2+-V5+). The significant challenges such as poor electrical conductivity and unstable structures limit the application of vanadium-based materials, particularly vanadium ...

In summary, this paper elaborates the application of graphite-derived materials (mesocarbon microspheres (MCMB), expanded graphite (EG), porous graphite (PG), and petroleum coke) in the preparation of electrodes for various alkali metal batteries. The following conclusions and ...

Preparation of artificial graphite coated with sodium alginate as a negative electrode material for lithium-ion battery study and its lithium storage properties+ Xianfa Rao acd, Lixia Zhang? b, Baobao Li? b, Xinxiong Zeng b, Wenlong Xiao b, Yitao Lou b, Huanmeng Xie b, Huchen Yan b, Zixuan Yi b and Shengwen Zhong * bd a College of Resources and Environmental ...

A lithium-ion capacitor fabricated using all-petroleum coke-derived carbon materials exhibits a high energy density of 80 W h/kg and a high power density of 8.4 kW/kg as well as long life span (85% capacity retention ...