Energy storage mechanism of antimony-based materials

Can antimony materials be used in commercial production?
The composite modification means can realize more considerable electrochemical performance enhancement [5,58]. Therefore,choosing pure antimony material may be one of the first choices for commercial production. In the sequel,we present applications of Sb-based anode materials and their derivatives and discuss their practical feasibility.

Why is advanced characterization important for antimony-based anode materials?
The introduction of advanced characterization techniques helps to gain insight into the potassium storage mechanism,electrochemical performance enhancement mechanism,and potassium ion diffusion mechanism of antimony-based anode materials.

Is antimony sulfide a good anode material?
Owing to its high theoretical specific capacity,effective working voltage,and abundant raw materials,antimony sulfide (Sb 2 S 3) was regarded as one promising anode materialfor electrochemical energy conversion and storage,especially regarding alkali-ion (Li +,Na +,and K +) batteries.

Why do antimony base metal anodes have high cycling stability?
This is attributable to their compositional disorder and structural disorder. This property can effectively alleviate the structural internal stresses generated in the alloying mechanism of antimony-based metals and their derivatives. This provides a clear idea for developing antimony base metal anodes with high cycling stability.

What is the theoretical capacity of antimony selenides?
The theoretical capacity of sodium storage contributed by the resulting material of the above two-step reaction is 670 mA?h/g(1 mol Sb 2 Se 3 -9 mol Na +) [7,17,18,20]. Evidently,the theoretical capacity of antimony selenides is less than that of antimony sulfides and oxides and it is equivalent to that of metal Sb.

Can antimony be commercialized?
Considerations are made in terms of the economics of the material and the fact that it can be commercialized. Pure antimony material,although energy density and power density are not as good as other materials. Its simple synthesis process can bring some economic benefits.

Abstract: Na-ion batteries (SIBs) are promising alternatives for Li-ion batteries owing to the natural abundance of sodium resources and similar energy storage mechanisms. Although significant ...

Request PDF | On Dec 12, 2023, Zhengqiao Yuan and others published Antimony Sulfide-Based Materials for Electrochemical Energy Conversion and Storage: Advances, Challenges, and ...

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Abstract Antimony-based materials are rapidly developing towards industrialization, making it crucial to control potential toxicity and address sustainable antimony ...

Potassium-ion batteries (PIBs) are considered as a promising energy storage system owing to its abundant potassium resources. As an important part of the battery composition, anode ...

In this work, multifunctional uniform antimony (Sb) nanoarrays are designed and grown on Ti 3 C 2 T x MXene paper. It is found that antimony can reversibly alloy with Zn to ...

This review focuses on the research progress of antimony oxide-based anode materials for alkali metal-ion storage, including electrochemical reaction mechanism and ...

The escalating global demand for sustainable energy technologies has intensified the pursuit of advanced electrochemical energy storage systems. Lithium-ion batteries are ...

This chapter dedicates itself to an in-depth exploration of the energy storage mechanism of MOF-based cathode materials, bifurcating the analysis into two parallel streams: ...

Antimony-based materials are recognized as a promising anode candidate because of their high theoretical capacities, appropriate potassiation ...

In this review article, we will focus on different categories of the emerging Sb based anode materials with distinct sodium storage mechanisms including Sb, two ...

According to the mechanism of sodium storage, different kinds of anode materials for fast charging SIBs are introduced. The commonly used methods to improve the ...

In this review, we will attempt to provide a full scope of the structures and properties of Sb-based materials and highlight effective strategies to design ...

Mechanistic Understanding of the Underlying Energy Storage Mechanism of ?-MnO2-based Pseudo-Supercapacitors Journal: Advanced Materials Published: 2024-11-01 ...

Potassium-ion batteries (PIBs) present great potential for large-scale energy storage applications owing to their high energy density and the ...

The great demands of high-performance energy storage devices have aroused huge amounts of research interest. Even though the state-of-the-art secondary batteries are ...

Energy storage mechanism of antimony-based materials

Abstract The development of alternative electrode materials with high energy densities and power densities for batteries has been actively pursued to satisfy the power ...

Silicon has a theoretical sodium-storage capacity of 954 mAh/g, which even exceeds that of tin (847 mAh/g). However, this capacity has never been reached in practice. ...

Owing to its high theoretical specific capacity, effective working voltage, and abundant raw materials, antimony sulfide (Sb2S3) was regarded as one promising anode ...

a Distribution of element content in the earth. b Theoretical capacity of various materials based on alloying reaction mechanism. c The ...

However, compared with the mushrooming cathode materials, the development of anode materials remain quite slow. Currently, depending on the energy storage mechanism, ...

Owing to its high theoretical specific capacity, effective working voltage, and abundant raw materials, antimony sulfide (Sb 2 S 3) was ...

Furthermore, antimony"s unique electrochemical behavior allows for improved charge/discharge rates, making it suitable for diverse applications ranging from consumer ...

Abstract Antimony (Sb) with stripping/plating behavior is attractive as anode material for aqueous energy storage. However, it suffers from unfavorable ion diffusion and de ...

Abstract The development of alternative electrode materials with high energy densities and power densities for batteries has been actively ...

Bismuth (Bi)-based materials have been receiving considerable attention as promising electrode materials in the fields of electrochemical energy storage, due to their ...

The introduction of advanced characterization techniques helps to gain insight into the potassium storage mechanism, electrochemical performance enhancement mechanism, and potassium ...

This review is devoted to overview the research progress on reaction mechanism and improvements in electrochemical performance of antimony oxides for alkali ...

This review clarifies charge storage mechanism of MnO 2 -based materials of aqueous Zn-ion batteries, and facilitates the fabrication of new-type cathode materials of ...

Thanks to its abundant reserves, relatively high energy density, and low reduction potential, potassium ion

batteries (PIBs) have a high potential for large-scale energy storage ...

The target is primarily to (1) investigate the adsorption behavior of Sb (III) on NiFeMnO x, (2) explore the chemical structure and mechanism of adsorption by characterizing ...

This review discusses various antimony-based anode materials applied to potassium ion batteries from various perspectives, including material selection, structural ...

In recent years, lots of attentions are devoted to developing new electrode materials with high sodium storage capacity and long life. In a large number of anode material ...

Liu et al. reviewed recent studies on Sb-based electrode materials for applications, storage mechanisms, and synthesis strategies in SIBs, LIBs, and LMBs (liquid metal batteries) (Liu Z. ...