

Can antimony be used as a storage material for aqueous Zn-ion batteries?

Even at 0.5 A g⁻¹, the optimal MXene@Sb-300 electrode also maintains highly reversible capacity of 148.43 mAh g⁻¹ after 1000 cycles, demonstrating the feasibility of antimony as alloying-type Zn storage material for aqueous Zn-ion batteries.

Can antimony be used as an alloying-type Zn storage anode?

Benefiting from the zincophilic antimony seeds and 3D MXene architecture, the MXene@Sb can significantly suppress Zn dendrite and achieve a long cycling life up to 1000 h. This study demonstrates the feasibility of antimony as alloying-type Zn storage anode and provides an effective approach to suppress Zn dendrites.

1. Introduction

Is antimony a promising reversible alloying-type anode for high-performance Zn-ion batteries?

These results verified the feasibility of antimony as a promising reversible alloying-type anode for high-performance Zn-ion batteries. Besides, the alloying/dealloying behaviors of Cu, Sn, Bi, and Ni electrodes were also explored.

Where is antimony used today?

“Today, antimony is used in lead-acid storage batteries for backup power and transportation; in chemicals, ceramics, and glass; in flame-retardant materials; and in heat stabilizers and plastics,” according to the USGS.

Why is antimony a good material?

While antimony's cosmetic status has waned over the past five millennia, the metalloid's ability to resist heat and corrosion, make stronger lead alloys, produce clearer glass for high-tech devices, and store renewable energy has created new uses for the ancient metal.

Can antimony be used in next-generation batteries?

While lead-acid battery usage is expected to decline as electric motors take the place of ICE engines in the vehicles traveling global highways, antimony is finding its way into new applications in next-generation batteries that can efficiently store electricity at the grid scale.

DOI: 10.1016/j.apcatb.2022.122032 Corpus ID: 252664523; Multifunctional Layered Bismuth Oxychloride/Amorphous Antimony Oxide Hetero-hybrids as Superior Photocatalyst and Potassium Ion Storage Materials

A recent article in Nature suggests that Ambri has switched to a lithium-antimony-lead liquid-metal battery materials system for its grid-scale energy storage technology. The company did not ...

This technology is involved in energy storage in super capacitors, and increases electrode materials for systems under investigation as development hits [[130], [131], [132]]. Electrostatic energy storage (EES) systems can be divided into two main types: electrostatic energy storage systems and magnetic energy storage systems.

DOI: 10.1002/aenm.201700447 Corpus ID: 99817717; Liquid-Phase Exfoliated Metallic Antimony Nanosheets toward High Volumetric Sodium Storage @article{Gu2017LiquidPhaseEM, title={Liquid-Phase Exfoliated Metallic Antimony Nanosheets toward High Volumetric Sodium Storage}, author={Jianan Gu and Zhiguo Du and C. Zhang ...

Owing to its high theoretical specific capacity, effective working voltage, and abundant raw materials, antimony sulfide (Sb_2S_3) was regarded as one promising anode material for electrochemical energy conversion and storage, especially regarding alkali-ion (Li^+ , Na^+ , and K^+) batteries. Currently, using chemical agents or minerals as precursors, numerous strategies ...

Traditionally, antimony has been combined with lead to create a strong, corrosion-resistant metal alloy, which is particularly useful in lead-acid batteries. However, recent innovation has found a new use for antimony--it now plays an essential role in large-scale renewable energy storage, which is critical to the clean energy movement.

Article from the Special Issue on Compact Thermal Energy Storage Materials within Components within Systems; Edited by Ana Lázaro; Andreas König-Haagen; Stefania Doppiu and Christoph Rathgeber ... Performance comparison of two PCM candidates for new concept of compact thermal storage in solar DHW systems. Gilles Fraisse, Maxime Thonon ...

Antimonene is an exfoliated 2D nanomaterial obtained from bulk antimony. It is a novel class of 2D material for energy storage applications. In the present work, antimonene was synthesized ...

A synergistic effect of combining antimony and MXene can be expected to obtain an optimized electrochemical system to overcome capacity fading of antimony while taking advantage of ...

DOI: 10.1016/j.mattod.2020.09.005 Corpus ID: 228815026; Recent advances in black-phosphorus-based materials for electrochemical energy storage @article{Sui2020RecentAI, title={Recent advances in black-phosphorus-based materials for electrochemical energy storage}, author={Yulei Sui and Jian Zhou and Xiaowei Wang and Ling Wu and Shengkui Zhong and ...

Considering that the antimony and the metal oxides are valuable enough for the energy storage, we designed our adsorbent relying on the working principle of energy storage material. It is a promising pathway that dopes transition metal into the composite, which improves both the electrochemical property and antimony adsorption capacity due to ...

The molten calcium-antimony design ... An analysis by researchers at MIT has shown that energy storage would need to cost just US \$20 ... She writes about energy, biotechnology, materials science ...

Antimony (Sb) metal has shown great potential as anode material for AABs by virtue of its acceptable price (\$7 kg⁻¹), negative working window (-0.66 V vs. SHE, standard hydrogen electrode), theoretical capacity (660 mA h g⁻¹ based on three-electron redox reaction) and stripping/plating charge storage mechanism in alkaline solution. . Moreover, the Sb metal ...

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

A high-temperature magnesium-antimony liquid metal battery comprising a negative electrode of Mg, a molten salt electrolyte, and a positive electrode of Sb is proposed and characterized and results in a promising technology for stationary energy storage applications. Batteries are an attractive option for grid-scale energy storage applications because of their ...

Energy Storage Science and Technology >> 2024, Vol. 13 >> Issue (8): 2649-2664. doi: 10.19799/j.cnki.2095-4239.2024.0180 o Energy Storage Materials and Devices o Previous Articles Next Articles Research progress of antimony- and bismuth-based metallic anode materials for sodium-ion batteries

This has necessitated the discovery of new high-performance electrode materials [1][2][3][4][5][6][7]. ... they are actively researched as next-generation energy storage materials. Antimony is a ...

Antimony (Sb)-based materials have garnered considerable attention as potential anode candidates for potassium-ion batteries (PIBs) due to multi-electron alloying reactions, providing a theoretical capacity surpassing that of commercial graphite [1], [2], [3], [4] addition to this distinct advantage, unique wrinkled layer structure and commendable working voltage ...

Due to its suitable working voltage and high theoretical storage capacity, antimony is considered a promising negative electrode material for lithium-ion batteries (LIBs) and has attracted widespread attention.

Thus, these advantages have made KIBs one of the most promising energy storage systems for large-scale energy storage [3]. Cathode materials such as oxocarbon salts [4], PTCDA [5], layered K_{0.5}V₂O₅ [6], and Prussian blue and its analogues [7,8] have shown good performance comparable to that of LIBs. Regarding anode materials, because of ...

Achieving a high energy density still remains a big challenge. Herein, we report a low-melting-point antimony-bismuth-tin positive electrode for LMB with high energy density ...

China has announced new export controls on antimony, a metal crucial for various applications including defense and energy storage. This decision, set to take effect on September 15, has raised concerns among

industry insiders about Beijing's potential to leverage its dominance in global supply chains in unprecedented ways.

A recent article in Nature suggests that Ambri has switched to a lithium-antimony-lead liquid-metal battery materials system for its grid-scale energy storage technology. The company did not confirm the new material. Ambri is the battery firm that is based on the research of Donald Sadoway, MIT professor of materials chemistry, and inspired by 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 major sources of energy in electric vehicles and portable electronics, there is an urgent need for new energy storage systems and materials with higher energy and power densities as well as ...

A new method for the synthesis of two-dimensional antimony (2D-Sb@NC) nanosheets with high selectivity from aldehyde groups in furfural is presented. Compared to bulk antimony, 2D-Sb@NC demonstrates enhanced electrochemical performance, providing a new approach for designing stable potassium-ion electrode materials.

The results demonstrate that alloying a high-melting-point, high-voltage metal (antimony) with a low-Melting-point, low-cost metal (lead) advantageously decreases the operating temperature while maintaining a high cell voltage. The ability to store energy on the electric grid would greatly improve its efficiency and reliability while enabling the integration of intermittent renewable ...

Their energy density, however, is low, and new materials are always being researched to improve it.^{3,4} Many antimony-based composites have recently demonstrated high capacity, which has spurred a lot of research into their use for energy storage. Because of its large theoretical capacity and adequate working

Researchers from Empa and ETH Zurich have succeeded for the first time to produce uniform antimony nanocrystals. Tested as components of laboratory batteries, these are able to store a large ...

Sodium-ion batteries (SIBs) are considered a potential alternative to lithium-ion batteries (LIBs) for energy storage due to their low cost and the large abundance of sodium resources. The search for new anode materials for SIBs has become a vital approach to satisfying the ever-growing demands for better performance with higher energy/power densities, ...

An unsung war hero that saved countless American troops during World War II, an overlooked battery material that has played a pivotal role in storing electricity for more than 100 years, and a major ingredient in futuristic grid-scale energy storage, antimony is among the most important critical metalloids that most people have never heard of. Whil...

In the field of energy storage, supercapacitors are another important energy-storage device with attractive

advantages, such as high-power density, ultrafast charging/discharging rate and longer cycle life as compared to other conventional energy-storage systems [3, 4]. According to different charge storage mechanism, supercapacitors can be ...

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