

VSe₂ zinc-ion battery energy storage wit

Does layered VSe₂ exhibit good Zn storage behavior?

Herein, we demonstrate that layered VSe₂ with a large interlayer spacing could exhibit excellent Zn storage behavior. Even with a micro-sized morphology, it exhibits a high specific reversible capacity of 250.6 and 132.6 mA h g⁻¹ at 200 and 5000 mA g⁻¹ and good cycle life.

Are transition metal dichalcogenides used in aqueous zinc-ion battery (AZIB) energy storage systems?

Based on a specific zinc storage mechanism and excellent electronic conductivity, transition metal dichalcogenides, represented by vanadium diselenide, are widely used in aqueous zinc-ion battery (AZIB) energy storage systems. However, most vanadium diselenide cathode materials are presently limited by low specific capacity and poor cycling life.

Can VS₂ be used as a cathode material for Zn²⁺ storage?

Conclusion In summary, a unique V²⁺-doped VS₂ as cathode material for Zn²⁺ storage was synthesized via a simple one-step solvothermal reaction. The presence of mass V²⁺ in the crystal structure introduces abundant defects in the interlayer and basal planes, providing more ion storage sites and diffusion paths for Zn²⁺.

Why are zinc ion batteries important?

Zinc ion batteries have attracted increasing research attention because of their unique merits (low cost, high safety, etc.). However, poor cycle stability, low energy density and sluggish reaction kinetics are still the major challenges for their further development. Exploring electrode materials with high

What is a rechargeable aqueous Zn-V₂O₅ battery?

Rechargeable aqueous Zn-V₂O₅ battery with high energy density and long cycle life ACS Energy Lett., 3 (2018), pp. 1366 - 1372, 10.1021/acsenergylett.8b00565 Polyaniline-expanded the interlayer spacing of hydrated vanadium pentoxide by the interface-intercalation for aqueous rechargeable Zn-ion batteries

What are rechargeable aqueous Zn-ion batteries?

Rechargeable aqueous Zn-ion batteries (ZIBs) are drawing sustained interest derived from low-cost of zinc anode, low redox potential, high energy density, green electrolyte and easy assembly process, . However, their development is mainly limited by the unsatisfied capacity and cyclic stability of cathode materials, .

Owing to the virtues of low cost, high security, and flexible structure design, zinc-ion batteries (ZIBs) have arisen widespread focus as a rising star in the application of energy-storage devices. Unfortunately, the further advancement of aqueous ZIBs is restricted by the unsatisfactory conduction of electron and structural instability of ...

As a typical transition-metal dichalcogenides, vanadium diselenide (VSe₂) is a promising electrode material for aqueous zinc-ion batteries due to its metallic characteristics and excellent electronic conductivity. In this

work, we propose a strategy of ...

Sustainable and effective energy storage techniques are currently pressingly demanded. Prominently, rechargeable magnesium batteries attract interest for large-scale applications because Mg anode is highly abundant and not easy to form dendrite [1]. However, exploring cathode materials is a main difficulty due to the bivalent Mg²⁺ cation. The high ...

Lithium-ion batteries (LIBs) have become vital energy-storage devices in electric vehicles (EVs). Li₄Ti₅O₁₂ (LTO) is a promising material of LIB because of its high rate capability ...

The VSe₂ nanosheets exhibit a discharge plateau at 1.0-0.7 V, a specific capacity of 131.8 mAh g⁻¹; (at 0.1 A g⁻¹), and a high energy density of 107.3 Wh kg⁻¹; (at a power density of 81.2 W...

Exploring electrode materials with high capacity, durability and fast Zn²⁺ ion diffusion is crucial to address the aforementioned challenges. Herein, we demonstrate that layered VSe₂ with a...

This work presents rechargeable zinc-ion batteries as a promising alternative to lithium, one that is particularly well equipped for stationary applications. 62 UL9540A, a component of UL9540, is the standard testing method for "evaluating thermal runaway fire propagation in battery energy storage systems. ...

Layered VSe₂ with high electronic conductivity, low ion migration barriers and large interlayer spacing is a potential cathode material for Zn-ion batteries (ZIBs). However, ...

An aqueous Zn/VS₂ battery is designed, which consists of a VS₂ cathode, a zinc anode, and a mild ZnSO₄ aqueous electrolyte. The battery delivers a high capacity, and exhibits long-term cyclic stability due to the large layer spacing and high conductivity of VS₂. A reversible insertion/extraction of Zn²⁺ is observed during the discharge/charge process.

Here, V²⁺-doped VS₂ is developed as a cathode material for aqueous zinc-ion battery. These V²⁺-doped VS₂ nanosheets are rich in defects in the interlayers and basal ...

The realizing of high-performance rechargeable aqueous zinc-ion batteries (ZIBs) with high energy density and long cycling life is promising but still challenging due to the lack of suitable layered cathode materials. The work reports the excellent zinc-ion storage performance as-observed in few-layered ultrathin VSe₂ nanosheets with a two ...

Vanadium diselenide (VSe₂), with large interlayer spacing, is a promising anode material for sodium-ion batteries (SIBs). However, due to the existence of a conversion reaction, VSe₂ will ...

The work reports the excellent zinc-ion storage performance as-observed in few-layered ultrathin VSe₂ nanosheets with a two-step Zn²⁺ intercalation/de-intercalation mechanism verified by ex situ X-ray

diffraction ...

Rechargeable aqueous zinc-ion batteries are promising candidates for large-scale energy storage but are plagued by the lack of cathode materials with both excellent rate capability and adequate ...

2D ultrathin VSe₂ is a very promising cathode material in ZIBs with remarkable battery performance superior to other layered transitional metal dichalcogenides and density functional theory calculation reveals a strong metallic characteristic and optimal zinc-ion diffusion pathway. Expand

Vanadium based aqueous zinc-ion batteries deliver a continuously growing capacity, which resulted from a continuous oxidation reaction of the vanadium-based ...

The growing concerns about the energy crisis and environmental pollution has prompted the development of environment friendly energy storage devices [1], [2], [3] the past few years, lithium-ion batteries have been widely used, however, the high price and insecurity of their electrode materials limit its long-term development [4]. Rechargeable aqueous Zn-ion ...

VO₂ (B), as a potential cathode of aqueous zinc-ion batteries (AZIBs), suffers from its intrinsic inferior electrical conductivity. Herein, Mn-doping VO₂ (MnVO) has been designed to modify its electronic structure, and thus improve the Zn²⁺ storage performance. The obtained MnVO electrode exhibits an excellent electrochemical performance at the current density of 5 ...

Vanadium diselenide (VSe₂), with large interlayer spacing, is a promising anode material for sodium-ion batteries (SIBs). However, due to the existence of a conversion reaction, VSe₂ will encounter a huge volume change during charging/discharging, resulting in electrode pulverization. On the other hand, VSe₂ nanosheets are prone to disordered stacking during ...

Aqueous zinc ion batteries (ZIBs) are one of the most promising energy storage systems due to low cost, high safety and theoretical capacity. However, it is still a challenge to achieve high-performance aqueous ZIBs with long cycle life and high energy density because of low conductivity and poor structural stability of cathode materials.

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Findings from Storage Innovations 2030 . Zinc Batteries . July 2023* ... of energy storage within the coming decade. Through SI 2030, the U.S. Department of Energy t ... ion batteries, are in development by companies such as Salient Energy (Canada) and Enerpoly (Sweden). Finally, ZnNi systems have - stationary storage identified that support ...

The realizing of high-performance rechargeable aqueous zinc-ion batteries (ZIBs) with high energy density

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Zinc ion batteries have attracted increasing research attention because of their unique merits (low cost, high safety, etc.). However, poor cycle stability, low energy density and sluggish reaction kinetics are still the major ...

VSe₂ is a promising anode material for Li-ion batteries (LIBs) due to its unique layered structure, and its metallic properties. However, further exploration to investigate the lithium storage performance of VSe₂ is limited by the synthesis difficulty of pure VSe₂. In this work, a novel nitrogen-doped carbon modified VSe₂ obtained by using p-phenylenediamine ...

The realizing of high-performance rechargeable aqueous zinc-ion batteries (ZIBs) with high energy density and long cycling life is promising but still challenging due to the lack of suitable ...

Abstract Rechargeable aqueous zinc-ion batteries (ZIBs) have resurged in large-scale energy storage applications due to their intrinsic safety, affordability, competitive electrochemical performance, and environmental friendliness. Extensive efforts have been devoted to exploring high-performance cathodes and stable anodes. However, many ...

Herein, we demonstrate that layered VSe₂ with a large interlayer spacing could exhibit excellent Zn storage behavior. Even with a micro-sized ...

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