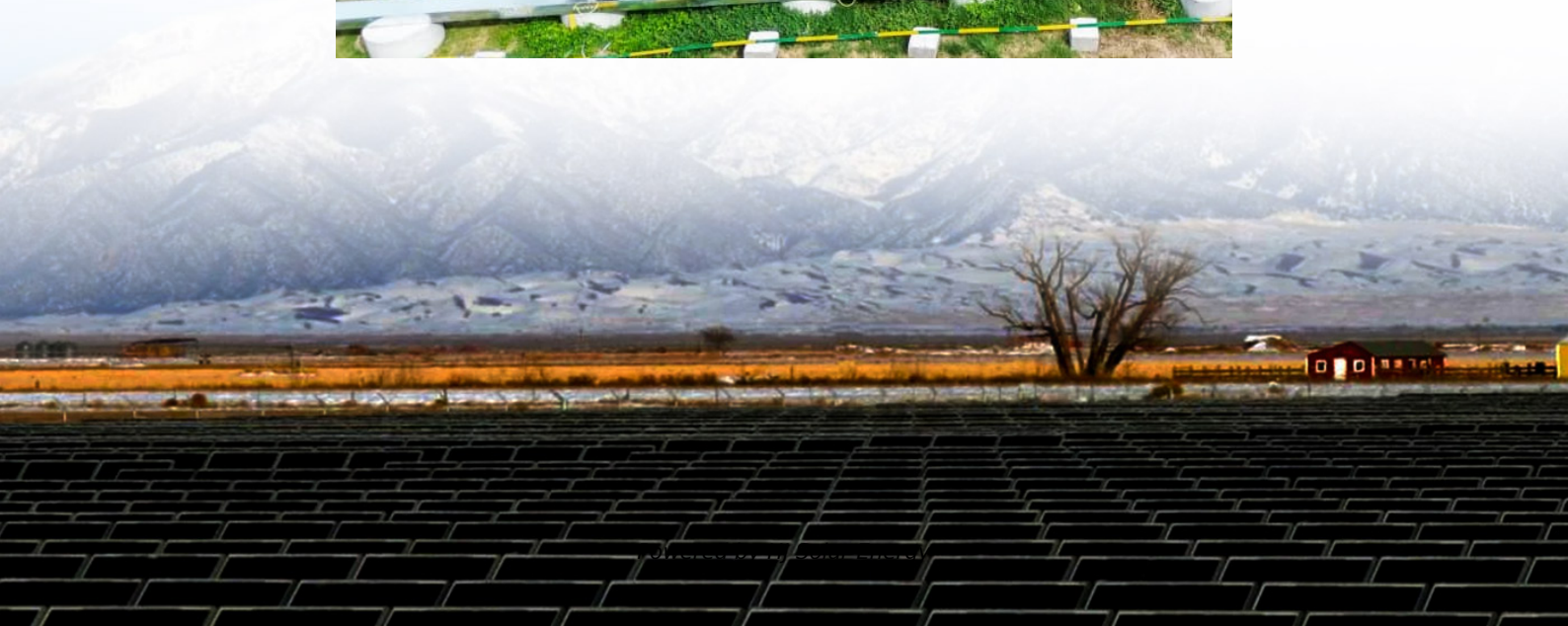


Vanadium-based energy storage materials





Overview

Vanadium sulfides, such as VS₂ and VS₄, have received considerable attention as an emerging class of materials with different chemical compositions, morphologies, crystal phases, and electrochemical activities in energy storage and conversion.

Vanadium sulfides, such as VS₂ and VS₄, have received considerable attention as an emerging class of materials with different chemical compositions, morphologies, crystal phases, and electrochemical activities in energy storage and conversion.

This book presents a comprehensive review of recent developments in vanadium-based nanomaterials for next-generation electrochemical energy storage. The basic electrochemical energy storage and conversion equipment are elaborated, and the vanadium-based nanomaterials of the synthesis approaches.

Energy storage and conversion technologies are considered to be the most promising ways to utilize renewable energy resources. Over the past few years, numerous researchers have dedicated their time to applying electrode materials toward attaining high energy density storage in metal-ion batteries.

Various advanced materials have been presented to pursue potential breakthroughs in energy and power. Among them, vanadium (V)-based materials benefiting from abundant resources, various polymorphs and valences, especially most with large interlayer spacings, are good candidates for multivalent-ion.

Vanadium-based oxides typically show low electrical conductivity, high repulsion for Zn²⁺, and severe structure collapse problems, resulting in unsatisfied cathode performance for aqueous Zn-ion batteries (AZIBs). Herein, we propose an advanced structural optimization strategy to address the above.



Vanadium-based energy storage materials



Vanadium based materials as electrode materials for high performance

Among them, vanadium based materials are being developed for this purpose. Vanadium based materials are known as one of the best active materials for high ...

Synthesis of Vanadium-Based Nanomaterials , SpringerLink

In brief, these three hydro-/solvothermal preparation approaches have been widely developed to synthesize different vanadium-based nanostructures, thereby resulting in great progresses in ...



[Vanadium-Based Nanostructure Materials for Advanced ...](#)

Lithium-ion batteries (LIBs) have evolved as the finest portable energy storage devices for the consumer electronics sector. Considering its commercial viability, extensive ...

Progress of vanadium-based oxides as cathode materials for ...

Additionally, the relationship between energy-storage mechanism and vanadium-based oxides structure requires clarification, thus offering valuable guidance for high-performance vanadium ...



Novel design of nickel and vanadium sulfide/oxide composites ...

Table 3 summarizes the electrochemical parameters for energy storage devices with nickel and vanadium sulfide and oxide-based active materials from previous studies and ...



Vanadium-based cathodes for aqueous zinc-ion batteries: ...

This review summarizes the latest progress and challenges in the applications of vanadium-based cathode materials in aqueous zinc-ion batteries, and systematically analyzes ...



Electrolyte engineering for efficient and stable vanadium redox ...

Abstract The vanadium redox flow battery (VRFB), regarded as one of the most promising large-scale energy storage systems, exhibits substantial potential in the domains of ...





Development of vanadium based hydrogen storage material: A ...

The metallic vanadium has an excellent hydrogen storage properties in comparison to other hydride forming metals such as titanium, uranium, and zirconium. The gravimetric storage ...



Recent developments in V2C MXene as energy storage materials...

The global commitment of reducing greenhouse gases by reducing our dependency on fossil fuels is bound to cause increased usage of energy storage devices in the ...

[Recent advances and perspectives on vanadium](#)

This article reviews the energy storage mechanism of the vanadium-based and manganese-based cathode materials for aqueous ZIBs. It focuses on discussing the ...



Development of vanadium based hydrogen storage material: A ...

Vanadium and vanadium based alloys are extensively studied as a candidate material for hydrogen storage and permeation applications. The efforts were made to enhance ...



Vanadium-Based Cathode Materials for Rechargeable

Abstract Due to the large reserves, low cost, high security and high energy density, rechargeable multivalent batteries have attracted extensive research enthusiasm for a ...



Vanadium-Based Cathode Materials for Rechargeable Multivalent ...

???: Vanadium-based materials, Cathode materials, Rechargeable multivalent batteries, Energy storage Abstract: Due to the large reserves, low cost, high security and high energy ...

Vanadium-Based Cathode Materials for Rechargeable ...

Abstract Due to the large reserves, low cost, high security and high energy density, rechargeable multivalent batteries have attracted ...





Vanadium Oxide-Based Electrode Materials for Advanced ...

In the direction of novel energy materials, one area of intense research focus is creating new electrode materials to enhance the electrochemical performance of ...

Progress and perspective of vanadium-based cathode materials for

With the rapid development of various portable electronic devices, lithium ion battery electrode materials with high energy and power density, long cycle life and low cost ...



Electrochemical activation of vanadium-based cathodes in ...

The electrochemical activation (ECA) strategy induced the reconstruction or transformation of vanadium-based materials into a host framework conducive to Zn²⁺ storage, ...

Recent trends in the development of vanadium carbide MXenes-based

Vanadium (V) based materials possess great potential in the field of electrochemical energy storage due to the abundance of metallic V in nature, abundant ...



[Fact Sheet: Vanadium Redox Flow Batteries \(October 2012\)](#)

Unlike other RFBs, vanadium redox flow batteries (VRBs) use only one element (vanadium) in both tanks, exploiting vanadium's ability to exist in several states. By using one element in both ...



[Unleashing Vanadium-Based Compounds for High-Energy ...](#)

Rechargeable aqueous zinc-ion batteries (ZIBs) are poised as a promising solution for large-scale energy storage and portable electronic applications. Their appeal lies in ...



Towards high-performance cathodes: Design and energy storage ...

Vanadium-based oxides as cathode materials for AZIBs have recently received wide attention for electrochemical energy storage and conversion (EESC) applications ...





[Recent advances of fabricating vanadium nitride ...](#)

The extremely high theoretical capacity, electronic conductivity, and wide voltage range endow vanadium nitride good electrochemical performance, while there are still great ...



Fundamentals of Vanadium-Based Nanomaterials , SpringerLink

In this chapter, we provide a general discussion about the basics of the vanadium-based nanomaterials, including the general information of vanadium, the history of ...

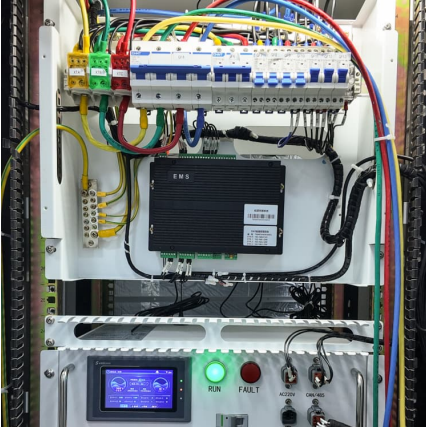
Pseudocapacitive Vanadium-based Materials toward High-Rate ...

The insight of sodium-ion storage mechanisms for various vanadium-based materials, including vanadium oxides, vanadates, vanadium sulfides, nitrides, and carbides are ...



[Vanadium sulfide based materials: synthesis. energy ...](#)

Energy storage and conversion technologies are considered to be the most promising ways to utilize renewable energy resources. Over the ...



Review of vanadium-based electrode materials for rechargeable aqueous

Vanadium-based compounds with various structures and large layer spacings are considered as suitable cathode candidates for ZIBs. In this review, the recent research ...



Vanadium-based cathodes for aqueous zinc-ion batteries: ...

To understand the working mechanism of vanadium-based materials as the cathode for AZIBs, the energy storage mechanisms of AZIBs, including Zn^{2+} ...



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