Rare metal energy storage

Aqueous zinc-ion batteries (ZIBs) combine the benefits of metallic Zn anodes with those of aqueous electrolytes and are well suited for large-scale energy storage because of their inherent high safety, cost-effectiveness, and eco-friendliness. Currently, the practical application of such batteries is hindered by the poor cycling performance of Zn anodes due to ...

Here, we are greatly honored to be as Guest Editors of the journal "Rare Metals" to present the special issue on "Advanced Energy Storage and Conversion Materials and Technologies". This special issue includes contributions from twelve groups whose researches range from various rechargeable batteries.

With the continuous development of two-dimensional (2D) transition metal carbides and nitrides (collectively referred to as MXene). Nowadays, more than 70 MXene materials have been discovered, and the number is still increasing. Among them, the V2CTx MXene has attracted considerable attentions due to its outstanding physical and chemical ...

The synergistic effects of high-entropy design and the PRP structure have led to boosted performance of MLCCs with an ultrahigh energy density of 20.8 J·cm -3 and an ...

Rare Metals Aims and scope Submit manuscript A general approach to construct alien metal atoms (Al, Cr, Mn, Fe, Co, Ni, Cu, Zn) doped in tin-phthalic acid complex for superior lithium storage ... Wang T, Chen SQ, Chen KJ. Metal-organic framework composites and their derivatives as efficient electrodes for energy storage applications: recent ...

The conjugation of external species with two-dimensional (2D) materials has broad application prospects. In this study, we have explored the potential of noble metal/2D MOF heterostructures in hydrogen storage. Specifically, the MgH2-Ni-MOF@Pd system has shown remarkable hydrogen desorption/sorption performances, starting to liberate hydrogen at 181 ...

Transition metal chalcogenides (TMCs) and TMCs-based nanocomposites have attracted extensive attention due to their versatile material species, low cost, and rich physical and chemical characteristics. As anode materials of lithium-ion capacitors (LICs), TMCs have exhibited high theoretical capacities and pseudocapacitance storage mechanism. However, ...

The application of novel eco-friendly energy storage ceramics with satisfactory properties is becoming more critical and essential due to environmental threats and energy ...

Electrical materials such as lithium, cobalt, manganese, graphite and nickel play a major role in energy storage and are essential to the energy transition. This article provides an in-depth assessment at crucial rare earth elements topic, by highlighting them from different viewpoints: extraction, production sources, and applications.

Lithium-ion batteries (LIBs) have become popular in life for a long period [1,2,3,4,5] comparison with other battery systems, LIBs are superior to high energy density, excellent electrochemical performance, unique design, etc. [6,7,8].When it comes to the high-performance cathodes in rechargeable batteries, commercial inorganic materials based on ...

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With the shortage of lithium resources, sodium-ion batteries (SIBs) are considered one of the most promising candidates for lithium-ion batteries. P2-type and O3-type layered oxides are one of the few cathodes that can access high energy density. However, they usually exhibit structural change, capacity decay, and slow Na ion kinetic. Herein, we present ...

Sodium-ion batteries show great potential as an alternative energy storage system, but safety concerns remain a major hurdle to their mass adoption. This paper analyzes the key factors and mechanisms leading to safety issues, including thermal runaway, sodium dendrite, internal short circuits, and gas release. Several promising solutions are proposed, ...

At present, solid-state hydrogen storage materials are usually referred to metals, including light metals, transition metals and rare earth metals. Figure 2 a summarizes the hydrogen densities of various metal hydrides and alkanes for comparison in terms of energy densities [23, 24, 25].

Electrostatic energy storage via capacitors has ultrahigh power density and ultrafast charge/discharge rate, making them possess unique advantage in the field of pulsed power systems [1,2,3,4,5,6,7] pared to ceramics, polymer dielectrics generally have magnitude higher electric breakdown strength and lightweight, mechanical flexibility, easy large ...

Antiferroelectric materials are promising candidates for energy-storage applications due to their double hysteresis loops, which can deliver high power density. Among the antiferroelectric materials, AgNbO3 is proved attractive due to its environmental-friendliness and high potential for achieving excellent energy storage performance. However, the ...

2.1 (V 10 O 28) 6- in LIBs. As a representative of energy storage devices, LIBs already enjoy a long history in the pursuit of electrode materials. Dating back to the past, the application of (V 10 O 28) 6--based electrode materials for LIBs is slightly earlier than those employed for other ion batteries.The reported results indicated that (V 10 O 28) 6--based materials present a ...

This report considers a wide range of minerals and metals used in clean energy technologies, including chromium, copper, major battery metals (lithium, nickel, cobalt, manganese and ...

Rare Metals - Cobalt selenide (CoSe2) has garnered considerable attention as a prospective anode candidate for advanced lithium-ion storage, prompting comprehensive investigations. ... Electrochemical energy storage (EES) has gained significant attention worldwide due to the strong support for advanced energy technologies and renewable energy ...

Rare-earth metals, also known as rare-earth elements (REEs), are a group of 17 chemically similar elements.Each has unique properties, making them important components for a range of technologies from low-energy lighting and catalytic converters to the magnets used in wind turbines, EVs and computer hard-drives. Neodymium and praseodymium, known together ...

Abstract Aluminum hydride (AlH3) is a covalently bonded trihydride with a high gravimetric (10.1 wt%) and volumetric (148 kg·m-3) hydrogen capacity. AlH3 decomposes to Al and H2 rapidly at relatively low temperatures, indicating good hydrogen desorption kinetics at ambient temperature. Therefore, AlH3 is one of the most prospective candidates for high ...

As one of the promising energy storage and conversion systems, supercapacitors (SCs) are highly favored owing to their high power density and good service life. Among all the key components of supercapacitor devices, the design and investigation of electrode materials play an essential role in determining the whole electrochemical charge ...

Supercapacitors (SCs) have remarkable energy storage capabilities and have garnered considerable interest due to their superior power densities and ultra-long cycling characteristics. However, their comparatively low energy density limits their extensive application in large-scale commercial applications. Electrode materials directly affect the performance of ...

Aqueous zinc-ion batteries (AZIBs) have been regarded as prospective rechargeable energy storage devices because of the high theoretical capacity and low redox potential of Zn metal. However, the uncontrollable formation of dendrites and the water-induced side reactions at the Zn/electrolyte interface, and the poor reversibility under a high current ...

Storage of hydrogen in solid-state materials offers a safer and compacter way compared to compressed and liquid hydrogen. Vanadium (V)-based alloys attract wide attention, owing to the total hydrogen storage capacity of 3.8 wt% and reversible capacity above 2.0 wt% at ambient conditions, surpassing the AB5-, AB2- and AB-type hydrogen storage alloys. ...

Ultrafast charge/discharge process and ultrahigh power density enable dielectrics essential components in modern electrical and electronic devices, especially in pulse power systems. However, in recent years, the energy storage performances of present dielectrics are increasingly unable to satisfy the growing demand for miniaturization and integration, which ...

Here, we review the applications of various rare earth promoted transition metal sulfides in energy storage and

conversion in recent years, which focuses on three ways in rare ...

Electrostatic capacitors based on dielectrics with high energy density and efficiency are desired for modern electrical systems owing to their intrinsic fast charging-discharging speed and excellent reliability. The longstanding bottleneck is their relatively small energy density. Herein, we report enhanced energy density and efficiency in the Aurivillius ...

With the rapid development of new energy and the high proportion of new energy connected to the grid, energy storage has become the leading technology driving significant adjustments in the global energy landscape. Electrochemical energy storage, as the most popular and promising energy storage method, has received extensive attention. ...

It is our great pleasure as Guest Editors of the journal "Rare Metals" to present the topic on "Advanced Energy Storage and Conversion Materials and Technologies". It provides the most recent research developments in various rechargeable batteries.

Rare Metals - High-entropy perovskite ferroelectric materials have attracted significant attention due to their remarkably low remnant polarizations and narrow hysteresis. ... The NBCSB materials produced using a typical solid-state process demonstrated exceptional performance in energy storage with a recoverable density of 1.53 J·cm-3 and a ...

Since the discovery of two-dimensional (2D) materials, they have garnered significant attention from researchers owing to the exceptional and modifiable physical and chemical properties. The weak interlayer interactions in 2D materials enable precise control over Van der Waals gaps, thereby enhancing their performance and introducing novel ...