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Electrochemical energy storage with mediator-ion solid electrolytes

What is a mediator-ion battery?

By properly managing the solid-state electrolyte (SSE), anolyte (the aqueous electrolyte at the anode), and catholyte (the aqueous electrolyte at the cathode), the mediator-ion battery concept will be a versatile approach for the development of a broad range of electrochemical energy storage systems. Figure 1.

Can a mediator-ion battery be used in large-scale electrochemical energy storage?

In this perspective, a recently proposed and validated mediator-ion battery concept is presented. It provides a novel strategy for the development of aqueous batteries with low-cost electrode materials to meet the growing needs of large-scale electrochemical energy storage.

Can a battery have a'mediator-ion' solid electrolyte?

This study presents a battery conceptwith a "mediator-ion" solid electrolyte for the development of next-generation electrochemical energy storage technologies. The active anode and cathode materials in a single cell can be in the solid,liquid,or gaseous form,which are separated by a sodium-ion solid-electrolyte separator.

What is an aqueous electrochemical energy storage cell?

Aqueous electrochemical energy storage with a mediator-ion solid electrolyte A voltage-enhanced, low-cost aqueous iron-air battery enabled with a mediator-ion solid electrolyte A zinc-cerium cell for energy storage using a sodium-ion exchange membrane Adv. Sustain. Syst., 1 (2017), p. 1700082

What is a mediator ion in a solid electrolyte?

The mediator-ion,i.e.,Li +-ion or Na +-ion,transport in the solid electrolyte acts as a "messenger" to balance the charge transfer at the anode and cathode,rather than being directly involved in the electrode reactions.

What is a mediator ion?

The uniqueness of this mediator-ion approach is that the redox reactions at the anode and cathode are sustained by a shuttling of the mediator alkali-metal ion between the anode electrolyte (anolyte) and the cathode electrolyte (catholyte).

Manthiram and Yu present a new battery concept with a "mediator-ion" solid-state electrolyte for the development of next-generation electrochemical energy storage technologies to meet the ...

Large-scale energy storage for the electric grid will require low-cost and high-energy-density solutions. We demonstrate in this letter a rechargeable zinc-aqueous polysulfide battery in which a metallic zinc anode ...

"",?,, ...

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As such, among the electrochemical energy storage community, there has been high interest in non-aqueous RFBs in recent years [17, 18]. ... we have presented and ...

This novel battery strategy with a mediator-ion solid electrolyte is applicable to a wide range of electrochemical energy storage systems with a variety of cathodes, anodes, and ...

Quinone series of organics are promising electrode materials for the development of low-cost, sustainable, environmentally benign electrochemical energy storage technologies. However, ...

Manthiram and Yu present a new battery concept with a "mediator-ion" solid-state electrolyte for the development of next-generation electrochemical energy storage technologies to meet the growing needs of large-scale energy storage.

Nonaqueous redox flow batteries (RFBs) are recently receiving growing attention as a promising candidate for grid energy storage applications.Primary benefits of nonaqueous ...

A novel battery strategy with a "mediator-ion" solid electrolyte can make the best use of liquid-phase or gas-phase electrode materials to develop low-cost, safe, aqueous ...

This perspective presents a new battery concept with a "mediator-ion" solid-state electrolyte for the development of next-generation battery technologies to meet the growing ...

A low-cost, safe, aqueous electrochemical energy storage concept with a "mediator-ion" solid electrolyte is also discussed. Advanced battery systems based on solid ...

By properly managing the solid-state electrolyte (SSE), anolyte (the aqueous electrolyte at the anode), and catholyte (the aqueous electrolyte at the cathode), the mediator ...

This study presents a battery concept with a "mediator-ion" solid electrolyte for the development of next-generation electrochemical energy storage technologies. The active anode and cathode materials in a single cell can be ...

1. Introduction Lithium-ion batteries (LIBs) and supercapacitors (SCs) with organic electrolytes have found widespread application in various electrochemical energy storage systems, ...

This study demonstrates a high-voltage aqueous zinc-quinone battery with an alkaline anode electrolyte (anolyte) and an acidic cathode electrolyte (catholyte), which are ...

A new type of aqueous iron-air (Fe-air) battery is demonstrated with an alkaline anode electrolyte (anolyte) and an acidic cathode electrolyte (catholyte). The anolyte and catholyte are separated by an alkali-metal-ion ...

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The U.S. Department of Energy"s Office of Scientific and Technical Information Electrochemical Energy Storage with an Aqueous Zinc-Quinone Chemistry Enabled by a ...

This study presents a battery concept with a "mediator-ion" solid electrolyte for the development of next-generation electrochemical energy storage technologies. The active ...

Authors: Yu, Xingwen; Manthiram, Arumugam Publication Date: Wed Nov 01 00:00:00 EDT 2017 Sponsoring Org.: USDOE OSTI Identifier: 1492879 Grant/Contract ...

The solid-state electrolyte effectively separates the anode from the reactive polysulfide catholyte, preventing the crossover of the polysulfide species and maintaining good electrochemical performance with a reversible ...

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