

Can rare earth elements be used in redox flow batteries?

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<div class="df_qntext">Why are rare earth elements used in lithium ion batteries?

Rare earth elements are used to enhance the performance of lithium-ion batteries, improving their charge capacity and lifespan. Additionally, research is ongoing into the use of REEs in solid-state batteries, a promising technology that offers improved safety and energy density compared to traditional lithium-ion batteries.

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Additionally, research is ongoing into the use of REEs in solid-state batteries, a promising technology that offers improved safety and energy density compared to traditional lithium-ion batteries. Beyond lithium-ion and solid-state batteries, rare earth minerals are also being explored for their potential in other innovative battery technologies.

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Zhao et al. discussed the current research on electrode/electrolyte materials using rare earth elements in modern energy storage systems such as Li/Na ion batteries, Li-sulphur batteries, supercapacitors, rechargeable Ni/Zn batteries, and the feasibility of using REEs in future cerium-based redox flow batteries.

<div class="df_qntext">Which energy storage devices use rare earth element incorporated electrodes?

Fig. 1. Schematic illustration of energy storage devices using rare earth element incorporated electrodes including lithium/sodium ion battery, lithium-sulfur battery, rechargeable alkaline battery, supercapacitor, and redox flow battery. Standard redox potential values of rare earth elements.

<div class="df_qntext">Can rare earth elements improve battery performance?

The growing interest in lithium-ion batteries, which power most modern electric vehicles, has also led to increased research into the potential use of REEs to enhance battery performance. The integration of rare earth elements into battery technologies is primarily focused on improving energy density, charge-discharge rates, and overall efficiency.

<div class="df_qntext">Can lithium-ion batteries be recycled for enabling a circular economy?

A review of lithium-ion battery recycling for enabling a circular economy. J. Power Sources 630, 236157 (2025). Ma, R. et al. Pathway decisions for reuse and recycling of retired lithium-ion batteries considering economic and environmental functions.

This article delves into the significance of rare earth minerals in the evolution of battery technology, exploring

their properties, applications, and the challenges associated with their use.

However, there are critical sustainability issues connected to the production of wind turbines, solar photovoltaic modules, electric vehicles and lithium-ion batteries such as the use of ...

Rare earth element production has a direct impact on the environment along the entire life cycle of rare earths, beginning from the mining and ending at the disposal of REE products.

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However, the application of rare earth compounds in lithium-sulfur batteries has not been reviewed so far, despite they showing obvious advantages for tuning polysulfide retention and ...

Critical raw materials (CRMs) - such as lithium, cobalt, and rare earth elements (REEs) - are essential commodities for the EU economy. They are also key enablers of Europe's digital, environmental, and ...

Despite this large literature, few articles focus on the challenges of rare earth in the energy transition concerning supply and demand. This paper will focus on examining the role of rare ...

Those wind turbines, for instance, require manganese, molybdenum, nickel, zinc, and rare-earth elements for their electrical generators, while electric vehicles (EVs) need cobalt, graphite, ...

Kunfeng et al. [4] highlighted new advancements in China on rare earth elements applied in electrode materials for electrochemical energy storage (i.e. lithium ion batteries and ...

The energy sector is currently undergoing a transition towards increased utilization of green energy technologies. The green energy transition relies heavily on metals, such as aluminium, ...

As the U.S. and China continue trade negotiations in Stockholm, one thing is clear: rare earth elements (REEs) are a powerful bargaining chip and a critical part of the future of American ...

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