

Can a solar transpiration-powered lithium extraction and storage device extract and store lithium?

Inspired by nature's ability to selectively extract species in transpiration, we report a solar transpiration-powered lithium extraction and storage (STLES) device that can extract and store lithium from brines using natural sunlight.

Are lithium-ion batteries a promising electrochemical energy storage device?

Batteries (in particular, lithium-ion batteries), supercapacitors, and battery-supercapacitor hybrid devices are promising electrochemical energy storage devices. This review highlights recent progress in the development of lithium-ion batteries, supercapacitors, and battery-supercapacitor hybrid devices.

What is solar-driven lithium extraction?

Solar-driven lithium extraction technology is an environmentally friendly and low-energy method that utilizes natural sunlight to evaporate salt lake brine for lithium ion extraction [18, 20, 21] (see Fig. 1).

What is solar evaporation-driven lithium extraction?

Learn more. Inspired by the natural process of transpiration-induced selective water and nutrient absorption, a solar evaporation-driven lithium extraction method has been developed by integrating interfacial evaporation with ion-selective membrane separation, which provides an alternative pathway toward energy-, cost-efficient lithium mining.

What Ion imprinted polymers are used for lithium extraction?

Organic adsorbents Ion imprinted polymers (Li-IIPs) used for lithium extraction mainly include crown ethers and calixarenes, with heterocyclic compounds represented by crown ethers gaining attention due to their specific recognition ability for lithium ions.

Can a lithium-ion selective membrane be used to extract lithium from seawater?

In 2015, an ISSE was used as a lithium-ion selective membrane to recover lithium from seawater², revealing the ion separation properties of these materials and extending their application potential to direct lithium extraction.

o Present technology of fabricating Lithium-ion battery materials has been extensively discussed. o A new strategy of Lithium-ion battery materials has mentioned to improve ...

Polyimide-based materials have emerged as promising contenders for the next generation of energy storage and conversion devices owing to their outstanding thermal stability, ...

In this paper, issues in the performance of common lithium-ion batteries are discussed. We also report on

recent studies on lithium-ion batteries and point out the fundamental information in ...

The review paper delves into the materials comprising a Li-ion battery cell, including the cathode, anode, current concentrators, binders, additives, electrolyte, separator, and cell casing, ...

As these nations embrace renewable energy generation, the focus on energy storage becomes paramount due to the intermittent nature of renewable energy sources like solar and wind. ...

The tungsten niobium oxides that belong to the well-known Wadsley-Roth shear structure have been already studied as the high-performance anode materials over the past several ...

This part reviews recent progress on cathode materials for electrochemical lithium extraction from the perspective of material modifications including structure regulation, ion doping, ...

Lithium-rich cathode materials face challenges due to the irreversibility of redox processes at high voltages, limiting their practical use. However, their significant potential is evident ...

Inorganic solid-state electrolytes, most known for their role in all-solid-state batteries, offer largely untapped potential as ion separation membrane materials for direct lithium...

Growing interest has emerged in membrane and electrochemical methods for the selective separation of lithium to enable direct lithium extraction.

Manipulating materials at the atomic and molecular levels has the potential to significantly improve lithium-ion battery performance. ...

The integration of novel materials such as NASICON-type ceramics, perovskites, sulfides, and garnet-based electrolytes is explored for their potential to revolutionize lithium-ion ...

Li-ion battery is an essential component and energy storage unit for the evolution of electric vehicles and energy storage technology in the future. ...

Lithium-ion capacitors (LICs) are combinations of LIBs and SCs which phenomenally improve the performance by bridging the gap between these two devices. In this review, we first ...

Electrochemical Li extraction methods, mainly including electrodialysis, electrolysis, and capacitive deionization (CDI), apply potential difference between electrodes to achieve charged ion separation ...

Additionally, it examines various cathode materials crucial to the performance and safety of Li-ion batteries, such as spinels, lithium metal oxides, and olivines, presenting their distinct ...

It could provide guidance on the development and design of more attractive electrochemical methods for lithium recovery from liquid resources, which will contribute to achieving ...

Anode materials are lithium, graphite, lithium-alloying materials, intermetallics, or silicon. 11 Lithium seems to be the most straight forward material but shows ...

The manufacturing of lithium-ion batteries (LIB) requires critical materials such as cobalt (Co) and lithium (Li) that are essential for clean-energy products including electric vehicles. Because ...

This review summarizes the latest advancements in molecular simulations for modeling electrochemical processes in lithium-ion batteries, ...

A device using the nanotube electrode as the positive electrode and lithium titanium oxide as a negative electrode had gravimetric energy ~5 times higher than conventional electrochemical capacitors, and ...

This review highlights recent progress in the development of lithium-ion batteries, supercapacitors, and battery-supercapacitor hybrid ...

Here we demonstrated a self-looped electrochemical battery recycling approach that enables efficient recycling of lithium and transition metals from spent cathode materials.

The widespread use of lithium-ion batteries (LIBs) in recent years has led to a marked increase in the quantity of spent batteries, resulting in critical ...

The main applications of rechargeable Li-ion batteries include portable electronic devices, electric vehicles, and solar energy storage. ...

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