HJ Solar Energy

Lithium battery chemistries enabled by solid-state electrolytes

Overview

What chemistries and systems are enabled by solid electrolytes?

This Review details recent advances in battery chemistries and systems enabled by solid electrolytes, including all-solid-state lithium-ion, lithium–air, lithium–sulfur and lithium–bromine batteries, as well as an aqueous battery concept with a mediator-ion solid electrolyte.

Can solid-state electrolytes be used for lithium batteries?

In the past two decades, many kinds of solid electrolytes with high ionic conductivity (σ Li+ > 1 mS cm −1) have been obtained and some of them even possess ultrahigh Li + conductivities, surpassing conventional OLEs . However, the industrial-scale application of solid-state electrolytes to lithium batteries still faces great challenges.

What types of electrolytes are used in lithium ion batteries?

The solid-state electrolytes used in lithium-ion batteries belong mainly to two classes of material: lithium-ion-conductive polymers and inorganic lithium-ion-conductive ceramics.

Are lithium batteries a solid electrolyte?

Since the 2000s, solid electrolytes have been used in emerging lithium batteries with gaseous or liquid cathodes, such as lithium–air batteries 50, 51, lithium–sulfur batteries 52, 53 and lithium–bromine batteries 54, 55. Solid-electrolyte sodium-ion batteries that operate at ambient temperatures have also been demonstrated 56.

Who supported the study of lithium battery chemistries enabled by solid-state electrolytes?

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authors declare no competing interests. Manthiram, A., Yu, X. & Wang, S. Lithium battery chemistries enabled by solid-state electrolytes.

Are solid-state electrolytes a good material for next-generation batteries?

Solid-state electrolytes have been positioned as materials for the next-generation batteries. Especially, all-solid-state lithium metal batteries are promising as they can realize high-energy-density, while being safe.

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In this Review, we provide a background overview and discuss the state of the art, ion-transport mechanisms and fundamental properties of solid-state electrolyte materials of interest for ...

[Lithium battery chemistries enabled by solid-state ...]

This article provides an overview of the history, properties and applications of solid-state electrolytes for various lithium battery chemistries. It discusses the challenges and ...

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We focus on recent advances in various classes of battery chemistries and systems that are enabled by solid electrolytes, including all-solid-

state lithium-ion batteries and

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Solid-State Electrolytes for Lithium Metal Batteries: ...

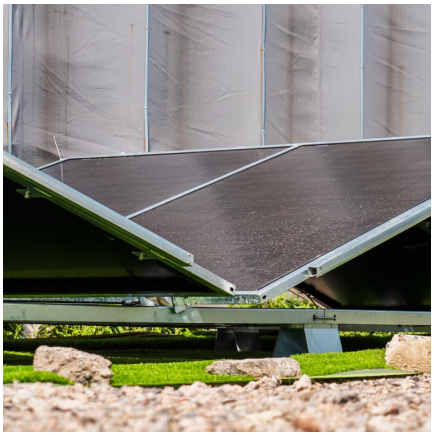
This review summarizes recent, past five years, advancements in solid-state electrolyte designs, and the performance of all-solid-state batteries, and provides an outlook for ...

Autonomous ion-highways quasi-solid electrolytes toward high ...

4 ???· Abstract Electrolyte solidification holds great promise in addressing safety concerns. Nevertheless, integrating high electrochemical stability and intrinsic interfacial compatibility ...

Recent advances and remaining challenges of solid-state electrolytes

4 ???· Abstract All-solid-state lithium batteries (ASSLBs) have garnered significant attention as a next-generation energy storage technology, providing superior safety, enhanced stability, ...



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Research Progress on Solid-State Electrolytes in Solid-State Lithium

For each kind of solid-state electrolytes, details on the preparation, properties, composition, ionic conductivity, ionic migration mechanism, and structure-activity relationship, ...

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