

How does pressure affect the stability of solid-state batteries?

The anode layer becomes more compressed with higher press, and the electrode slightly expands upon release. (b) Relative conduction coefficient and the dependence of the SE volume fraction . Non-uniform external pressure has critical impacts on the stability of the solid-solid interfaces in the solid-state batteries.

Why do we need external pressure for solid-state batteries?

Optimizing the Young's modulus of solid electrolytes is critical to battery performance. The high interfacial resistance of solid electrolyte/electrode interfaces impedes the development of solid-state batteries (SSBs). To mitigate this issue, it is necessary to apply external pressure to SSBs during cell fabrication and cycling.

Why are solid-state batteries important?

Solid-state batteries have garnered significant attention and investment due to their numerous advantageous characteristics, such as their resistance to ignition and capacity to attain substantial energy densities. Material selection for the anode influences the energy density of a solid-state battery.

Why do we use silicon electrodes in solid-state batteries?

Addressing concerns such as low conductivity, pulverization, fracture, dense solid electrolyte interface layer, and low coulombic efficiency has substantially improved the use of silicon electrodes in solid-state batteries.

Why are mechanical contacts important in a solid-state battery?

In batteries with solid-solid interfaces, mechanical contacts, and the development of stresses during operation of the solid-state batteries, become as critical as the electrochemical stability to keep steady charge transfer at these interfaces.

How does external pressure affect battery life?

Studies have shown that the introduction of external pressure can effectively reduce the "solid-solid" contact resistance and prolong the cycle life of the battery. At the same time, the application of external pressure on the electrode materials has dramatic multiple interdisciplinary consequences.

Representing a contemporary paradigm in energy storage, lithium (Li) metal solid-state battery (SSB) employing a solid-state electrolyte (SSE) ... Janek et al. ...

We explored safer, superior energy storage solutions by investigating all-solid-state electrolytes with high theoretical energy densities of 3860 mAh g⁻¹, corresponding to the ...

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Solid-state battery research has gained significant attention due to their inherent safety and high energy density. Silicon anodes have been promoted for their advantageous characteristics, including high volumetric ...

The intrinsic mechanism of CCIE and its effects on both the Li⁺ conductivity and the interfacial stability at RT were clarified. The assembled all-solid-state batteries without ...

This review systematically summarizes the thermal effects at different temperature ranges and the corresponding strategies to minimize the impact of such effects in ...

Solid-state lithium batteries may provide increased energy density and improved safety compared with Li-ion technology. However, in a solid-state composite cathode, mechanical degradation due to repeated ...

Furthermore, the solid Li/elastic electrolyte/LiFePO₄ battery delivers 143.3 mAh g⁻¹ after 400 cycles. Finally, the micron-sized Si/elastic electrolyte/LiFePO₄ full cell operates ...

Kalnaus et al. reviewed our understanding of the mechanics of solid-state batteries and the effect of having multiple solid-solid interfaces. They also looked at ways to ...

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The safety of a solid lithium battery has generally been taken for granted due to the nonflammability and strength of SEs. However, recent results have shown the release of ...

Solid-state batteries employ a solid-state electrolyte (SE) in pursuit of superior safety and to enable the use of a lithium metal anode, which in turn may provide energy ...

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4 ???· Discover the transformative potential of solid state batteries (SSBs) in energy storage. This article explores their unique design, including solid electrolytes and advanced electrode ...

Here, by quantifying microstructural properties and employing modeling techniques, the authors provide insight into solid-state battery failure modes and offer design ...

Feng, L. et al. Glassy/ceramic $\text{Li}_2\text{TiO}_3/\text{Li}_x\text{B}_y\text{O}_z$ analogous "Solid Electrolyte Interphase" to boost 4.5 V LiCoO_2 in sulfide-based all-solid-state batteries. Adv. ...

This review aims to construct a comprehensive perspective on the effect of pressure on SSBs, with a specific focus on decoupling the interfacial/bulk electrochemo-mechanical dynamics. In particular, the adverse ...

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