

SolarInvert Energy Solutions

New solid-state silicon energy storage





Overview

The team demonstrated a laboratory-scale full cell that delivers 500 charge and discharge cycles with 80% capacity retention at room temperature, which represents exciting progress for both the silicon anode and solid-state battery communities. What is a solid state battery?

Solid-state batteries, using solid electrolytes instead of liquid ones, achieve much higher energy density (up to 500 Wh/kg) than traditional liquid lithiumion batteries (200-300 Wh/kg). This provides more energy in the same volume and reduces battery size.

Can solid-state battery technology revolutionize energy storage?

Rapid advancements in solid-state battery technology are ushering in a new era of energy storage solutions, with the potential to revolutionize everything from electric vehicles to renewable energy systems.

What is a silicon solid-state battery (SSB)?

Learn more. For the first time, we demonstrate a silicon solid-state battery (SSB) architecture that achieves >400 Wh kg -1, approaching the theoretical limit for silicon-based SSBs. This configuration features a 99.9 wt% micro-Si, a thin sulfide solid electrolyte (SSE), and a high-loading NMC811.

What is a high-energy silicon solid-state battery?

A high-energy silicon solid-state battery exceeding 400 Wh kg⁻¹ is demonstrated using a 99.9 wt% micro-Si anode, a thin sulfide electrolyte, and high-loading NMC811 cathode. Optimized dry/wet processing and interface engineering enable excellent cell cycling stability.

Are silicon-based all-solid-state batteries safe?

Silicon-based all-solid-state batteries offer high energy density and safety but face significant application challenges due to the requirement of high external pressure. In this study, a Li 21 Si 5 /Si-Li 21 Si 5 double-layered anode is



developed for all-solid-state batteries operating free from external pressure.

When will solid-state batteries reach a large-scale application?

Sun Huajun, CTO of BYD's battery division, predicted that solid-state batteries would achieve a large-scale application around 2030. China's edge in mass-producing all-solid-state batteries lies in its vast industry and market scales.



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Pushing the Limits: Maximizing Energy Density ...

May 27, 2025 · A high-energy silicon solid-state battery exceeding 400 Wh kg?¹ is demonstrated using a 99.9 wt% micro-Si anode, a thin sulfide electrolyte, and ...

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11 New Battery Technologies To Watch In 2025

Dec 12, 2024 · We explore cutting-edge new battery technologies that hold the potential to reshape energy systems, drive sustainability, and support the ...



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Oct 21, 2021 · The battery uses both a solid state electrolyte and an all-silicon anode, making it a silicon all-solid-state battery. The initial rounds of tests show that the new battery is safe, long ...

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Building better solid-state batteries with silicon ...

Jul 17, 2023 · Abstract Silicon (Si)-based solid-state batteries (Si-SSBs) are attracting tremendous attention because of their high energy density and ...

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Silicon Solid State Battery: The Solid-State ...

Apr 15, 2024 · The graphical abstract presents a Silicon solid-state battery that incorporates differently designed particles onto a solid electrolyte, ...

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Solid-state silicon batteries could last longer and ...

Sep 27, 2021 · Researchers have created a solid-state battery with an all-silicon anode that could potentially deliver long life, high energy density and fast ...

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New all-solid-state battery holds promise for ...

Sep 27, 2021 · For many years, scientists have been allured by the game-changing





energy density silicon promises nextgeneration batteries, but ...

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The Next Big Silicon Battery Breakthrough Is So ...

Mar 2, 2023 · "The company manufactures 100% dry, safe and high performance silicon elastic composite solid-state batteries to power the new energy ...



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China embraces next-gen solidstate battery ...

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Dynamic volume compensation realizing Ah-level all-solidstate silicon

Apr 28, 2025 · Here, authors exploit the inherent volume change dynamics of silicon and sulfur electrodes and design a stress-neutralized solid-state battery.

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Solid state battery design charges in minutes, lasts for ...

Jan 8, 2024 · But, in a solid state battery, the ions on the surface of the silicon are constricted and undergo the dynamic process of lithiation to form lithium metal plating around the core of ...





Role of Pressure and Expansion on the ...

Feb 9, 2025 · A simulation technique for assessing both the fabrication and





operation of a solid-state Si battery is demonstrated by integrating particle ...

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Solid-state battery gains double speed boost from secret ...

Jun 3, 2025 · Hidden layer in solid-state batteries could unlock faster, safer power storage New battery tech boosts how quickly ions move in solid-state systems, offering a safer, high ...



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New Solid-State Battery Designed with a Silicon ...

Oct 4, 2021 · The new solid-state battery features a cathode composite layer, a sulfide solid electrolyte layer, and a carbon-free micro-silicon layer, making it

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Solid-state battery breakthrough promises 100x charging ...

May 20, 2025 · Liquid potassium anodes show 100x performance boost--but a new solid electrolyte is key to room-temperature use.

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New High-Performance Solid-State Battery Surprises the Engineers ...

Sep 24, 2021 · Engineers have created a new battery that merges solid-state electrolyte and all-silicon anode technologies, forming a silicon all-solid-state battery. Early tests indicate it is ...



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Challenges and opportunities towards silicon-based all-solidstate

Aug 1, 2023 · Silicon-based all-solid-state batteries (Si-based ASSBs) are recognized as the most promising alternatives to lithium-based (Li-based) ASSBs due to their low-cost, high-energy



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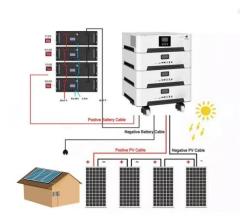
Sep 12, 2021 · Solid-state batteries designed with high ion conductive composite polymer electrolyte and silicon anode, Energy Storage Materials -X-MOL

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Paving the way for the future of energy storage with solidstate





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