

Silicon (Si) is a promising anode material for the next generation of lithium-ion batteries (LiBs) due to its high theoretical capacity. However, Si undergoes a significant volumetric expansion ...

A bottom-up performance and cost assessment of lithium-ion battery pouch cells utilizing nickel-rich cathode active materials and silicon-graphite composite anodes.

Silicon-based anode materials for lithium-ion batteries have advantages such as high theoretical specific capacity, low lithium-insertion/extraction potential, and excellent fast-charging ...

OverviewHistorySilicon swellingCharged silicon reactivitySolid electrolyte interphase layerLithium-silicon batteries are lithium-ion batteries that employ a silicon-based anode and lithium ions as the charge carriers. Silicon-based materials, generally, have a much larger specific energy capacity: for example, 3600 mAh/g for pristine silicon. The standard anode material graphite is limited to a maximum theoretical capacity of 372 mAh/g for the fully lithiated state LiC_6 . Silicon's vast volume change (approximately 400% based on crystallographic densities) when lithium i...

Our comprehensive review aims to foster further research into silicon-based materials for use as anodes in lithium-ion batteries. We hope this review will serve as a valuable resource in ...

Silicon battery anodes work by absorbing lithium ions during the charging process. Lithium ions move from the cathode to the anode, where they are stored as the battery charges. Silicon can ...

Lithium-ion batteries are the most popular secondary batteries for these applications, and silicon is widely regarded as the best anode material for lithium-ion batteries, particularly solid-state ...

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Silicon (Si) anode is widely viewed as a game changer for lithium-ion batteries (LIBs) due to its much higher capacity than the prevalent graphite and availability in sufficient quantity...

By addressing both the technical innovations and economic considerations surrounding Si anodes, this review provides a comprehensive roadmap for overcoming existing barriers, paving ...

Silicon (Si) has emerged as a potent anode material for lithium-ion batteries (LIBs), but faces challenges like low electrical conductivity and significant volume changes during lithiation/delithiation, leading to ...

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