

What are the advantages and disadvantages of silicon/carbon composites?

Core-shell silicon/carbon (Si/C) composites can greatly relieve the Si large volume change and accelerate the low Li<sup>+</sup> conductivity; however, cracking of carbon shell and the failure of the electrode structure still limit the lithium storage capability and cyclic life.

Does carbonized Pan encapsulate Si particles?

It has been found that in such fibers, Si particles are encapsulated by the carbon shell of fibers, which can settle the shortcomings of pulverization and volume variation of Si. Furthermore, the highly conductive N-C shell derived from carbonized PAN can accelerate the diffusion of Li<sup>+</sup> and charge transport.

Why do we need silicon-based composite electrodes for high performance lithium-ion batteries?

Constructing silicon (Si)-based composite electrodes that possess high energy density, long cycle life, and fast charging capability simultaneously is critical for the development of high performance lithium-ion batteries for mitigating range anxiety and slow charging issues in new energy vehicles.

What is Si-carbon anode material derived from recycled wire-cutting polysilicon waste?

Here, we present a novel Si-carbon anode material (Si/G@TNS-60) derived from recycled wire-cutting polysilicon waste, featuring a unique structure with an internal anchoring load and an external wrapping of flexible two-dimensional (2D) material.

How does carbon matrix encapsulate VGSS@Si-C?

The carbon matrix encapsulates VGSS@Si-C to decrease the specific surface area (2.6 m<sup>2</sup> g<sup>-1</sup>) and increase the tap density (1.04 g cm<sup>-3</sup>), thus yielding high first CE (91.2%) and electrode compaction density (1.62 g cm<sup>-3</sup>). In view of these advantages, C/VGSS@Si-C shows outstanding Li<sup>+</sup> storage performances under industrial electrode conditions.

Can silicon be used as an anode material for a lithium-ion battery?

Find more information on the Altmetric Attention Score and how the score is calculated. At present, the main limitations for the practical application of silicon (Si) as an anode material of a lithium-ion battery are huge volume variation and low electrical conductivity.

Herein, a feasible and cost-effective prelithiation method under a localized high-concentration electrolyte system (LHCE) for the silicon-silica/graphite (Si-SiO<sub>2</sub>/C@G) anode is designed for stabilizing the ...

The as-prepared Si@C@ZIF-67-800N possesses several features: 1) phenolic resin-based carbon coated silicon can restrain the volume expansion of silicon to a certain ...

Electrochemical scissoring of disordered silicon-carbon composites for high-performance lithium storage. Author links open overlay panel Jaegeon Ryu a 1, Taesoo Bok b ...

It is well known that chemical vapor deposition (CVD) is a feasible approach to catalytically grow graphitic carbon layer onto Si anode surface, along with the presence of ...

Lithium-ion battery (LIB) is an attractive and environmentally friendly energy source due to its versatile applications ranging from portable systems to electric vehicles, including ...

Tween 80-assisted synthesis of high conductivity silicon-carbon composites as anode materials for high-performance lithium-ion batteries ... easily scalable and ...

Silicon oxidation plays a critical role in semiconductor technology, serving as the foundation for insulating layers in electronic and photonic devices. This review delves into the potential of silicon nanoparticles and microparticles ...

Silicon-carbon composite nanofibers are employed as anode materials in LIBs, combining the excellent conductivity of carbon materials with the high theoretical capacity of ...

The combination of silicon and carbon materials which effectively relieve the volume expansion of silicon and improve the overall electrical conductivity is becoming one of ...

As markets look for better rechargeable batteries to meet exponentially increasing demand across sectors, silicon batteries have emerged as the technology of choice for ...

Energy Storage Materials. Volume 66, 25 February 2024, 103243. ... The structure's thick walls and narrow-diameter HCMs, together with the uniform dispersion of ...

Nanostructured silicon/carbon (Si/C) composite anodes improve cyclic stability and rate performance by combining the high capacity of Si with the conductivity and stability of ...

The sustainable development of crystalline silicon (c-Si) photovoltaic solar power generation and silicon-based energy storage is expected to promote the integration of the ...

In summary of the above studies on the core-shell structure of silicon carbon anode [83, [89], [90], [91]], as known that the silicon-carbon core-shell structure is an advanced ...

Silicon-based all-solid-state batteries (Si-based ASSBs) are recognized as the most promising alternatives to lithium-based (Li-based) ASSBs due to th...

Carbon is commonly used as a protective layer on the outside of active materials or acts as an embedding matrix to improve electric conductivity and alleviate deleterious volume ...

In this regard, thermal energy storage (TES) systems have gained significant attention due to their high capacity and flexibility, emerging as an effective strategy for ...

Constructing silicon (Si)-based composite electrodes that possess high energy density, long cycle life, and fast charging capability simultaneously is critical for the ...

The multilevel carbon architecture strategy involving subnanoscale C in the Si-C nanospheres, VGSs, and carbon matrix has multiple advantages: (1) subnanoscopically and uniformly dispersed C in the Si-C composite ...

Polymer-derived silicon oxycarbide (SiOC) comprised of amorphous SiOC (a network of corner-shared Si-centered tetrahedra incorporating Si-C and Si-O) and free ...

Silicon/carbon (Si/C) composites, combining the high capacity of silicon and stability of carbon, show promise as anode materials in rechargeable batteries. ... this review discusses the challenges and prospects of the ...

The promotion of global carbon neutrality and need for new energy technologies have necessitated the urgent development of energy storage/conversion devices with rapid ...

Journal of Energy Storage 81 (2024) 110418 Available online 13 January 2024 2352-152X/194;169; 2024 Elsevier Ltd. ... since this economy is relied upon to provide clean and ...

A honeycomb-cobweb inspired hierarchical core-shell structure design for electrospun silicon/carbon fibers as lithium-ion battery anodes. Carbon (2016) G ... and etc., ...

Silicon has been touted as one of the most promising anode materials for next generation lithium ion batteries. Yet, how to build energetic silicon-based electrode architectures by addressing the structural and ...

Group14 is tapping into its expertise in making porous carbon materials for batteries and ultracapacitors. ... says CTO Costantino. "Amorphous silicon is the ideal form for energy storage. It ...

Yang et al. propose a cost-effective strategy for large-scale and continuous production of Si-based anodes by using economical micron-sized Si and gelatin as precursors. The gelatin-derived carbon networks with dual ...

Shenzhen Key Laboratory of Advanced Energy Storage, Southern University of Science and Technology, Shenzhen, China ... obtained by soaking in porous silicon with petroleum pitch along with high-temperature annealing, ...

The traditional graphite anode materials of lithium ion batteries cannot meet the high energy density demands of the advanced electric and hybrid automobile market due to its ...

The electrochemical applications of porous Si-based electrocatalysts in energy conversion reactions such as hydrogen evolution reaction, oxygen evolution reaction, oxygen ...

Carbon nanotubes-enhanced lithium storage capacity of recovered silicon/carbon anodes produced from solar-grade silicon kerf scrap. Author links open overlay panel Jian Shi ...

A new energy-storage material has been developed by embedding Si nanoparticles as an alloying medium in electrospun carbon nanofibers. Anodes made from these carbon/Si ...

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