The significance of studying silicon oxycarbide energy storage materials

Could silicon oxycarbide ceramics be a potential electrode material for lithium ion batteries?
These ceramics can serve as potential electrode materials in sustainable sodium-based energy storage systems in the future. Polymer-derived silicon oxycarbide ceramics (SiCO) have been considered as potential anode materialsfor lithium- and sodium-ion batteries.

What is the synergistic effect of silicon oxycarbide?
Similarly,David and co-workers fabricated self-standing anodes consisting of silicon oxycarbide in a matrix of reduced graphene oxide to get the components' synergistic effect . Reduced graphene oxide serves as a percolation network,which increases electrical conductivity,whereas amorphous SiOC particles increase lithium storage.

Are porous silicon oxycarbides a promising anode material for lithium-ion batteries?
Porous SiOC featuring macropores exhibits excellent electrochemical properties. The porous and amorphous silicon oxycarbides (SiOC) derived from polymer precursors are regarded as promising anode materials for lithium-ion batteriesdue to their high theoretical capacity and minimal volume expansion.

Is silicon oxycarbide a promising anode material?
In addition to Si and SiOx materials, silicon oxycarbide (SiOC) material derived from polymer precursors has attracted considerable attention as a promising anode material due to its acceptable theoretical specific capacity (1230 mAh g -1), small volume expansion (22 %), and good electrical conductivity .

Can silicon oxycarbide be substituted for crystalline Si-based anodes?
Silicon oxycarbide (SiOC) materials,which are synthesized using a polymer-derived ceramic (PDC) route,have been investigatedas a substitute anode material for crystalline Si-based anodes. The specific capacity of these SiOC materials ranges from 200-1300 mA h g -1.

What is silicon oxycarbide (Sico)?
Silicon oxycarbide (SiCO) follows a corner-sharing tetrahedral structure of SiC x O 4-x (x =0-4) 25 and can be described as a glassy network of vitreous silica glasses,with carbon partly replacing oxygen.

Thesis Overview In this section, a brief outline of the whole thesis is presented. The purpose of this thesis is to synthesize silicon oxycarbide (SiOC) ceramics and study the Li-intercalation ...

Silicon oxycarbide (SiOC)-based materials are a class of polymer-derived ceramics that enables the formation of a homogeneous structure at the molecular level starting ...

Silicon oxycarbide (SiCO) has a remarkable reversible capacity of lithium and is believed to be a promising

anode material for the new generation of lithium-ion batteries. Although current ...

Herein we present a study on polymer-derived silicon oxycarbide (SiOC)/graphite composites for a potential application as an electrode in high power energy storage devices, such as Lithium ...

In this study, we introduce a pioneering methodology for crafting silicon oxycarbonitride materials (SiOCN) by harnessing the intricate synergy between allyl ...

Herein we present a study on polymer-derived silicon oxycarbide (SiOC)/graphite composites for a potential application as an electrode in high power energy ...

1. Introduction Over the past few years, there has been increasing interest in small high-power energy storage devices. For these applications electrochemical capacitors (ECs) are ...

Lithium-ion batteries (LIBs) are the energy storage system of choice for the electrification of transportation and portable electronics. They are also being actively considered to meet the ...

For example, Lee et al. recently reported a composite anode material consisting of anti-mony embedded in a silicon oxycarbide matrix, where the good long-term cycling stability of the ...

Rechargeable lithium batteries play an increasingly significant role in our daily lives. Hence, the development of high capacity secondary lithium batteries has become a ...

Silicon oxycarbide (SiOC) has been regarded as potential anode for lithium-ion secondary batteries (LIBs) due to high reversible capacities (higher than conventional graphite) ...

The fabrication of porous ceramic materials is of great importance for various applications in energy, catalysis, filtration, and ...

Lee, Maximizing the utilization of active sites through the formation of native nanovoids of silicon oxycarbide as anode materials in lithium-ion batteries, Energy Storage Mater., No 35, ?. 130

Supporting: 2, Mentioning: 35 - We report here on the synthesis and characterization of silicon oxycarbide (SiOC) in view of its application as a potential anode material for Li-ion batteries.

The practical application of silicon oxycarbide (SiOC) based electrodes has been restricted by poor rate performance and under capacity retention on account of sluggish ...

Kurzbeschreibung (Abstract) Herein we present a study on polymer-derived silicon oxycarbide (SiOC)/graphite composites for a potential application as an electrode in high power energy ...

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Silicon oxycarbide is defined as a metastable material that consists of silicon atoms connected to both carbon and oxygen, typically represented by the formula [SiC x O 4-x], where x can be 1, ...

Thus far, research on silicon oxycarbide (SiOC, SiOnC4-n (0 <= n <= 4)) as an anode material for lithium-ion batteries (LIBs) has been focused on the quantity and quality of the carbon ...

C. Vakifahmetoglu, V. Presser, S. Yeon, P. Colombo, Y. Gogotsi, Enhanced hydrogen and methane gas storage of silicon oxycarbide derived carbon, Microporous Mesoporous Mater. ...

In this work, we present the characterization and electrochemical performance of various ternary silicon oxycarbide/graphite/tin (SiOC/C/Sn) nanocomposites as anodes for lithium-ion batteries.

Here, a novel computational strategy combining machine learning and first-principles is proposed to achieve efficient high-throughput screening of oxides and sulfides ...

Thesis Overview In this section, a brief outline of the whole thesis is presented. The purpose of this thesis is to synthesize silicon oxycarbide (SiOC) ceramics and study the Li-intercalation ...

Herein we present a study on polymer-derived silicon oxycarbide (SiOC)/graphite composites for a potential application as an electrode in high power energy storage devices, ...

Maximizing the utilization of active sites through the formation of native nanovoids of silicon oxycarbide as anode materials in lithium-ion batteries

In this review, we discuss the various factors that influence SiOCs" electrochemical performance, storage mechanisms, and recent developments. ...

In this study, we introduce a pioneering methodology for crafting silicon oxycarbonitride materials (SiOCN) by harnessing the intricate synergy between allyl-substituted hydrido polycarbosilane ...

Li-ion battery technology is one of the promising energy storage solution for the future. Studies based on electrode materials are one of the key step to improve the energy storage ...

The porous and amorphous silicon oxycarbides (SiOC) derived from polymer precursors are regarded as promising anode materials for lithium-ion batteries due to their high ...

First-principles calculations demonstrate significant compact of material type and elemental doping on interfacial compatibility between silicon oxycarbide and various electrolytes.

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Oxycarbide glass, also referred to as silicon oxycarbide, is a type of glass that contains oxygen and carbon in addition to silicon dioxide. [1] It is created by substituting some oxygen atoms ...

These limitations hinder the practical application of silicon for LIB anodes. To address this issue, intensive studies, focused on silicon-based materials such as silicon ...

Silicon oxycarbide (SiOC) materials, which are synthesized using a polymer-derived ceramic (PDC) route, are investigated as a substitute anode material for crystalline Si-based anodes.

Silicon carbide (SiC) and silicon oxycarbide (SiOC) ceramic/carbon (C) nanocomposites are prepared via photothermal pyrolysis of cross-linked polycarbosilanes and polysiloxanes using a ...

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