# Amorphous silicon thin film battery

Are hydrogenated amorphous silicon thin-films suitable for lithium-ion batteries?
Therefore,hydrogenated amorphous silicon thin-films have demonstrated their suitabilityas an alternative for anodes in lithium-ion batteries. Our findings highlight that the PECVD technique offers the potential to explore various preparation conditions that can produce aSi:H films with high conductivities and low polyhydride contents.

What are the properties of amorphous silicon films?
Using these deposition parameters,the optical,electrical and structuralproperties of amorphous silicon films have been analyzed as functions of the substrate temperature and the concentration of phosphine R,which is defined as the ratio between the flow rate of phosphine/hydrogen mixture and that of silane (Equation (2)).

Can amorphous silicon be used as a thin film?
To solve this drawback,using amorphous silicon as a thin filmoffers several advantages: its amorphous nature allows for better stress mitigation and it can be directly grown on current collectors for material savings and improved Li-ion diffusion. Furthermore,its conductivity is easily increased through doping during its growth.

Can plasma-enhanced chemical vapor deposition improve the amorphous silicon thin film anode?
In this paper,plasma-enhanced chemical vapor deposition (PECVD) is used to prepare a nano-scale pure hydrogenated amorphous silicon thin film anode,which improves the problem of large volume effectof traditional silicon-based anode materials during the charge and discharge process of lithium-ion batteries.

Can silicon be used as an anode material for rechargeable lithium batteries?
Owing to its high theoretical capacity of ~4200 mAh g -1 and low electrode potential (<0.35 V vs. Li +/Li),utilising silicon as anode material can boost the energy densityof rechargeable lithium batteries. Nevertheless,the volume change (~300%) in silicon during lithiation/delithiation makes stable cycling challenging.

What is the reversible specific capacity of pure hydrogenated amorphous silicon film?
The thinnest 120 nm pure hydrogenated amorphous silicon film still has the reversible specific capacity of 1254.6 mAh g -1at 0.5C for 200 cycles,and can also maintain the discharge specific capacity of 848.2 mAh g -1 at 5C.

Herein, the hydrogenated amorphous silicon (a-Si:H) thin film electrodes are prepared by radio frequency sputtering followed by ex-situ hydrogenation. The electrochemical properties of a-Si:H electrodes are tested experimentally, and the electrochemical hydrogen storage behaviors of a-Si:H electrodes are analyzed by first-principles calculations. The results ...

Amorphous silicon thin film can effectively solve the volume expansion problem of silicon. ... Neware battery

test system (CT-4000, Shenzhen, China), Princeton electrochemical workstation and Corrtest Electrochemical Station were used for detecting the electrochemical characteristics of the coin cells. 3. Results and discussion 3.1. Microstructural characteristics. ...

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A new advanced Li-ion battery comprising a high performance amorphous columnar silicon thin film anode, a high voltage LiNi 0.5 Mn 1.5 O 4 spinel composite cathode and fluoroethylene carbonate (FEC)-based electrolyte solution (FEC/DMC 1:4 with 1 M LiPF 6) is reported.This advanced battery demonstrated hundreds of cycles, excellent charge-discharge ...

Operando Nanomechanical Mapping of Amorphous Silicon Thin Film Electrodes in All-Solid-State Lithium-Ion Battery Configuration during Electrochemical Lithiation and Delithiation Ridwan P. Putra, Kyosuke Matsushita, Tsuyoshi Ohnishi, and Takuya Masuda* Cite This: J. Phys. Chem. Lett. 2024, 15, 490-498 Read Online

A Si thin film of thickness 275 nm was deposited on rough Cu foil by magnetron sputtering for use as lithium ion battery anode material. X-ray diffraction (XRD) and TEM ...

DOI: 10.1016/J.JPOWSOUR.2005.05.012 Corpus ID: 95883933; Electrochemical performance of amorphous-silicon thin films for lithium rechargeable batteries @article{Moon2006ElectrochemicalPO, title={Electrochemical performance of amorphous-silicon thin films for lithium rechargeable batteries}, author={Taeho Moon and Chunjoong Kim and ...

We can show that the silicon thin film electrodes with an amorphous C layer showed a remarkably improved electrochemical performance in terms of capacity retention and Coulombic efficiency. The C layer is able to ...

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Sputter-deposited amorphous silicon thin films on metallic copper current collectors are widely studied as lithium-ion anode systems. Electrochemical results indicate ...

A Si thin film of thickness 275nm was deposited on rough Cu foil by magnetron sputtering for use as lithium ion battery anode material. X-ray diffraction (XRD) and TEM analysis revealed that...

DOI: 10.1016/J.ELECTACTA.2011.01.124 Corpus ID: 93313471; Amorphous silicon-carbon based nano-scale thin film anode materials for lithium ion batteries @article{Datta2011AmorphousSB, title={Amorphous silicon-carbon based nano-scale thin film anode materials for lithium ion batteries},

author={Moni Kanchan Datta and Jeffrey P. ...

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In this work, we focused on a comprehensive study of the influence of both electrical and structural properties of intrinsic and doped hydrogenated amorphous silicon ...

Silicon has emerged as a highly promising anode material for lithium-ion batteries (LIBs) owing to its high specific capacity and low voltage. However, previous research on silicon-based anodes has not adequately ...

In this work, we focused on a comprehensive study of the influence of both electrical and structural properties of intrinsic and doped hydrogenated amorphous silicon (aSi:H) thin-film anodes on the specific capacity and stability of lithium-ion batteries. This study allows us to establish that hydrogen distribution in the aSi:H ...

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