# Amorphous silicon thin film battery components

Are silicon thin-film anodes amorphous or nanocrystalline?

In general,pure silicon thin-film anodes can have either one of two possible structures namely: nanocrystalline or amorphous. Amorphous materials do not contain any long-range atomic ordering [111 ]. However,most pure thin-film anodes fabricated to date (and cited in this study) possessed an amorphous structure as given in Table 1.

What is the discharge capacity of a thin-film anode?

The amorphous silicon thin-film anode exhibited an initial discharge capacity of ~3500mAh g -1and retained a capacity of ~2000mAh g -1 over 50 cycles,while the nanocrystalline silicon exhibited a discharge capacity of approximately 1100mAh g -1 with only a ~50% capacity retention after 50 cycles.

Are amorphous Si anode films cyclable?

Previous work has shown that amorphous Si anode films with thickness of up to 0.3 µm display high capacity and good cyclability(for instance,in our previous work 7,8,1st discharge capacity >3000 mAh g -1 and a capacity retention of ~85% after 100 cycles) in solid electrolytes 7,8,9,10.

Is silicon a good anode material for lithium-ion batteries?

Silicon has emerged as a highly promising anode materialfor lithium-ion batteries (LIBs) owing to its high specific capacity and low voltage. However,previous research on silicon-based anodes has not adequately addressed inherent issues,leading to limited commercial applications on a large scale.

What are the different structures of silicon-based thin-film anodes?

Silicon-based thin-film anodes can have different structures as follows: Non-traditional structure silicon-based thin-film. While the above list indicates that a variety of silicon-based anodes have been investigated,the emphasis of this review will be focused on the continuous pure silicon thin-film anodes.

Do amorphous porous silicon films maintain high capacity during cycling?

Here we report enhanced cycling performances achieved using nanostructured silicon films and inorganic solid electrolyte and show that amorphous porous silicon films maintain high capacity upon cycling(2962 mAh g -1 and 2.19 mAh cm -2 after 100 cycles).

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Amorphous silicon thin films with honeycombed structures have been prepared using a self-assembled monolayer of polystyrene spheres as the template. The as-prepared ...

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The first observation of doping in Amorphous Silicon (a-Si) was achieved in 1975 by Spear and LeComber, a year later in 1976 it was demonstrated that Amorphous Silicon (a ...

Amorphous silicon thin films with honeycombed structures have ... composed of nanometre- or micrometre-thick components, may ... thin-film Li-ion battery applications.

(XPS) study on amorphous Si thin filmelectrodes revealed the formation of amorphous lithium silicide Li x Si (0 <x 3.5) and a metastable crystalline Li 15 Si 4 phase throughout the first ...

where ? 0 = 8.85 × 10 -18 F/µm and ? SiN the relative dielectric constant of the silicon nitride. It is nevertheless interesting to recall that the threshold voltage is a big issue ...

For the case of a thin film solid state battery composed of amorphous silicon anode, lithium phosphorus oxynitride (LiPON) solid electrolyte, and lithium vanadium oxide (Li ...

The amorphous silicon thin-film anode exhibited an initial discharge capacity of ~3500 mAh g -1 and retained a capacity of ~2000 mAh g -1 over 50 cycles, while the ...

The basic components of a LIB, as shown in Fig. 2, are the negative electrode (anode), positive electrode (cathode), and an electrolyte immersed separator, to confer the ...

An operando bimodal atomic force microscopy system was constructed to perform nanomechanical mapping of an amorphous Si thin film electrode deposited on a Li 6.6 La 3 Zr ...

Amorphous silicon-based thin film solar cells with a band gap of 1.8 eV outperform conventional traditional monocrystalline silicon PV by more than 20-25% under ...

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