Nitrogen doping of porous carbon materials for sodium-sulfur batteries

Does nitrogen dopant and NIS 2 nanocrystal entrap soluble polysulfides in the cathode?
It also suggests that the dual effect of chemical binding by the nitrogen dopant and NiS 2 nanocrystal enables both strong entrapmentof soluble polysulfides and preferential deposition of insoluble Na 2 S 2 /Na 2 S within the cathode during cycling.

Can nitrogen-doped carbon nanomaterials be used in electrochemical batteries?
The use of nitrogen-doped carbon nanomaterials in various electrochemical batteriessuch as lithium ion batteries,lithium-sulfur batteries,metal-air (oxygen) batteries and sodium ion batteries is then discussed with a focus on their electrochemical properties.

Does ammonia introduce sulphur doping in carbon lattices?
Ammonia,besides the role of porogen,is also an efficient nitrogen dopant and hence can also introduce nitrogen doping in the carbon lattices whereas,sulphur doping can also take place from the released sulphur-containing gases. Figure 1.

Which carbon nanomaterials are nitrogen-doped?
In this review paper,the recent advances in the synthesis and property of nitrogen-doped carbon nanomaterials including carbon nanotubes,graphene,porous carbon,and carbon nanofibers are highlighted first.

Does nitrogen-doped mesoporous carbon promote chemical adsorption of sulfur?
Song,J. et al. Nitrogen-doped mesoporous carbon promoted chemical adsorption of sulfurand fabrication of high-areal-capacity sulfur cathode with exceptional cycling stability for lithium-sulfur batteries. Adv. Funct. Mater. 24,1243 (2014).

Do doped nitrogen atoms promote fast conversion from polysulfide to Na 2 s?
Besides,both in situ synchrotron XRD and DFT results confirm that the doped nitrogen atoms coupled with the NiS 2 nanocrystals serve as effective electrocatalytic sites,which significantly promote fast conversionfrom polysulfide to Na 2 S.

Benefiting from the large specific surface area, abundant micro/nanoporous structure, and nitrogen-self-doping, the obtained NPC sheets can significantly boost space confinement for ...

The resulting porous carbon material achieved high doping level (9.3 at% for nitrogen and 3.5 at% for sulphur) and increased interlayer spacing from 0.35 to 0.38 nm which ...

In general, we used nitrogen doped porous carbon as host to improve the cycle performance of sulfur-rich polymers as the cathode of Na-S batteries, which prevent the chemical reaction of polysulfides with sodium

anode effectively. The synergistic effect of physical confinement come from porous carbon and covalent confinement origin ...

Heteroatom-doped carbon nanomaterials have attracted significant attention as anode materials for sodium-ion batteries (SIBs). Herein, we demonstrate a conjugated polymer-mediated synthesis of sulfur and nitrogen co-doped carbon nanotubes (S/N-CT) via the carbonization of sulfur-containing polyaniline (PANI) nanotubes. It is found that the ...

Especially, the combination of high surface area, good electrical conductivity, and nitrogen doping allows carbon nanowires to deliver excellent electrochemical performance in both supercapacitors and lithium-sulfur batteries. Drawing from their captivating characteristics, the hierarchically porous nitrogen-doped carbon nanowires (NCNW), which originate from ...

Herein, we present a multifunctional sulfur host with NiS 2 nanocrystals implanted in nitrogen-doped porous carbon nanotubes (NiS 2 @NPCTs). First, the one-dimensional conductive NPCTs...

Hierarchical porous carbon materials (HPCMs) with appropriate nitrogen doping have been successfully fabricated from the gelatin by KOH activation. The HPCMs contain porous structure with suitable nitrogen content (2.85%), which specific surface area reach up to 1006 m2 g-1. When applied as anode materials for sodium ion batteries, the HPCMs deliver superior ...

Hierarchically porous carbon with enriched pyridinic nitrogen (N-HPC) is fabricated via a simple acid treatment of oxide grapheme, NH 4 + electrostatic adsorption and subsequent thermal treatment. Benefiting from the hierarchically porous structure and high pyridinic nitrogen doping, N-HPC can improve sodium-ion storage and Li-S batteries.

The resulting porous carbon material achieved high doping level (9.3 at% for nitrogen and 3.5 at% for sulphur) and increased interlayer spacing from 0.35 to 0.38 nm which improves the storage kinetics of Na +-ions inside the carbon lattice.

In this study, we introduce a simple approach to synthesis Sb/C-PANI nanocomposite with ultrafine Sb nanoparticles uniformly embedded in hierarchically porous N ...

Dong C, Guo L, He Y, et al. Ultrafine Co 1-x S nanoparticles embedded in a nitrogen-doped porous carbon hollow nanosphere composite as an anode for superb sodium-ion batteries and ...

In this study, we designed and synthesized a 3-D hierarchical nitrogen and sulfur co-doped porous carbon electrode via in-situ doping and activation using acesulfame potassium. Owing to its prominent structural advantages, the as-prepared N, S co-doped electrode showed a high reversible capacity (459.8 mAh g -1 at 0.05 A g -1 ...

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In this review paper, the recent advances in the synthesis and property of nitrogen-doped carbon nanomaterials including carbon nanotubes, graphene, porous carbon, and carbon nanofibers are highlighted first.

Aqueous Zn-S batteries exhibit high capacity, energy density, low cost, and safety performance, making them a promising energy storage system. However, the practical application is restricted by poor conductivity of sulfur, slow sulfur redox kinetics, and high energy barriers. Herein, density functional theory (DFT) was first adopted to simulate and design ...

One of the most promising carbon materials has been thought to be biomass porous carbon materials with large ... The performance of nitrogen doping and defect incorporation in improving electrochemical properties was evaluated by galvanostatic charge/discharge tests. Figure 6a illustrates the first charge/discharge curves of CS and ACS ...

Benefiting from the large specific surface area, abundant micro/nanoporous structure, and nitrogen-self-doping, the obtained NPC sheets can significantly boost space confinement for sulfur molecules and effectively alleviate the dissolution of sodium polysulfides during the charge-discharge process in RT Na-S batteries.

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