

JH Solar

Carbon-based phenolic energy storage



Overview

Are phenolic resins a good material for hard carbon preparation?

Despite their toxicity, phenolic resins are interesting materials for hard carbon preparation since they deliver a high carbon yield and their characteristics can be tuned, as mentioned before, by both physical and chemical conditions.

Can phenolic resins produce hard carbon in sodium ion batteries?

This Review exclusively highlights the state-of-the-art preparation of hard carbon from phenolic resins, and the electrochemical performance in sodium-ion batteries. Cross-linked resins are prepared from three phenolic monomers (phenol, resorcinol, and phloroglucinol) to produce hard carbon.

Are phenolic resins eco-friendly?

In this paper, we propose a green, simple and scalable procedure to obtain phenolic resins which by pyrolysis at high temperature ($>1000\text{ }^{\circ}\text{C}$) result in eco-friendly hard carbons with low surface area, disordered structure and high carbon yield.

What is phenolic resin pyrolytic carbon?

The carbon materials are referred to as PF-S-X-T, where X represents the mass ratio of phenolic resin to sucrose, and T is the carbonization temperature. The pure phenolic resin pyrolytic carbon (PF-1200) and sucrose pyrolytic carbon (S-1200) were also prepared following the same solvent heat treatment and carbonization process.

How phenolic resin is transformed into hard carbon?

Thermal analysis techniques (TGA and TPD-MS) were employed to study the transformation of phenolic resin into hard carbon. During the thermal treatment process which is performed under inert atmosphere (argon flow), volatiles such as H_2O , CO , CO_2 , H_2 , etc, are removed from the composition of the phenolic resin.

Do phenolic resin-derived hard carbons have surface defects?

However, phenolic resin-derived hard carbons usually exhibit abundant surface defects due to the release of gas molecules during the pyrolysis process. In addition, the relatively ordered graphite microcrystalline in phenolic resin-derived hard carbon further limits accessible Na-storage active sites.

Carbon-based phenolic energy storage



Highly graphitized carbon foam to construct phase change ...

Carbon-based materials, including graphitic carbon foams (CFs), are pleasing candidates for improving the energy storage and release processes of PCMs thanks to their ...

Improving the initial Coulombic efficiency of phenolic resin-derived

This study deepens the understanding of phenolic resin-based hard carbon and offers valuable guidance for achieving high ICE in such materials.



Phenolic resin-based nanoflower porous carbon synthesized by ...

Recently, carbon-based materials have emerged as the predominant choice for capacitor electrodes owing to their stable chemical properties, wide availability and low cost ...

Highly N-doped microporous carbon nanospheres with high energy storage

Porous carbon spheres (CSs) have distinct

advantages in energy storage and conversion applications. We report the preparation of highly monodisperse N-doped ...



Hard carbon anodes derived from phenolic ...

PF-S based hard carbon heterostructures were evaluated against different experimental variables such as phenolic resin/sucrose ratio and carbonization temperature to realize a combination with an optimum ...

Phenolic Resin-Based Porous Carbons for Adsorption and Energy Storage

Request PDF , Phenolic Resin-Based Porous Carbons for Adsorption and Energy Storage Applications , The main objective of this dissertation research is to develop ...



Phenolic Resin Derived Hard Carbon Anode for ...

This Review exclusively highlights the state-of-the-art preparation of hard carbon from phenolic resins, and the electrochemical performance in sodium-ion batteries.

Boosting sodium-ion storage in hard carbon via polyethylene ...

...

Phenolic resin-derived hard carbon materials are promising anodes for sodium-ion batteries (SIBs). However, conventional synthesis methods rely on toxic formaldehyde and yield ...



Phenolic resin-based porous carbons for adsorption and energy storage

The main objective of this dissertation research is to develop phenolic resin based carbon materials for range of applications by soft-templating and Stober-like synthesis strategies.

...

High-Yield Preparation and Properties of Phenolic ...

With good dispersion and fluidity, high packing density, large specific surface area, short ion diffusion distance, and rich pore structure, carbon microspheres (CS) show promising applications in the ...

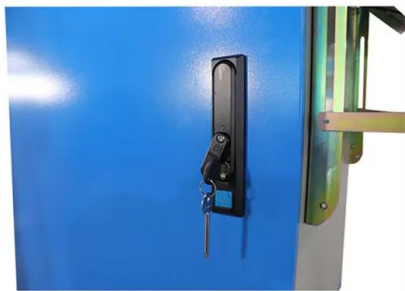


Polyethylene glycol-impregnated carbon quantum dots-phenolic ...

The development of stable smart thermal energy storage systems is the key to reaching breakthroughs in thermal management technologies based on phase change ...

A comprehensive evaluation of synthesis methods for porous carbon

Porous carbon materials have emerged as a promising class of materials for energy storage applications due to their unique properties, including high surface area, ...



Tailoring closed pore structure in phenolic resin derived hard carbon

Given the high carbon yield and good consistency, phenolic resin is widely used as the raw material to construct hard carbon. In order to achieve a better capacity and ICE ...

Facile and scalable preparation of cage-like mesoporous carbon ...

Accordingly, the present work offers a simple and scalable approach to prepare cage-like mesoporous carbon with excellent electrochemical performance from lignin-based ...



Hard carbons derived from green phenolic resins for Na-ion batteries

Carbon-based materials have been studied theoretically and experimentally for a long time as electrode materials for energy storage in applications such as supercapacitors, ...

Carbon-Based Nanomaterials in Energy Storage Devices

Current research and future developments will center on the efficient utilization of low-dimensional nanomaterials composed of carbon for converting and storing energy devices.



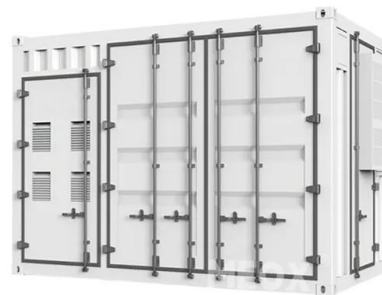
Hard carbons derived from green phenolic resins for Na-ion batteries

In this paper, we propose a green, simple and scalable procedure to obtain phenolic resins which by pyrolysis at high temperature (>1000 °C) result in eco-friendly hard ...

Hierarchically Fe-doped porous carbon derived from phenolic

...

Supercapacitors are promising for high power application in the recent years. In particular, the conversion of simple and available carbon materials into economic and high ...



Polymerization-Pyrolysis-Derived Hierarchical ...

Nitrogen-doped porous carbons are attractive electrode materials for supercapacitors because of their high specific capacitance and desirable surface property. Here, we report a facile polymerization ...

Exceptional electrochemical properties of coconut shell carbon-phenolic

In order to achieve performance that transcends the limitations of a single material (primarily in terms of energy density and durability), promising carbon-based composites have been widely ...



Preparation of lignin based phenolic resin microspheres with

Therefore, the lignin based phenolic resin carbon microspheres had a good application prospect in electrochemical energy storage materials. It would not only improve ...

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In the realm of energy storage, mechanochemical coordination of TA and Fe³⁺ has been employed to fabricate highly microporous carbon materials, demonstrating significant potential ...



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May 29, 2018: Congratulations on the acceptance of our Communication entitled "SiO₂-protected shell mediated templating synthesis of Fe-N-doped carbon nanofibers and their enhanced ...

Insights into the structure-property relationships of activated carbon

Our findings advance the understanding of carbon-based materials for hydrogen storage, thereby contributing to enhanced renewable energy integration and improved energy ...



Phenolic Resin Derived Hard Carbon Anode for ...

Sodium-ion batteries are complementary to lithium-ion batteries for grid-scale energy storage applications due to lower cost, safety, and potential for sustainable supply chains. The past decade has ...

Nanoarchitectonics of simple preparation of phenolic resin-based carbon

Spherical porous carbon materials demonstrate outstanding performance as energy storage electrode materials in supercapacitors. However, challenges exist in precisely ...



Lignin-based materials for electrochemical energy storage devices

Here, this review firstly focuses on the concept, classification, and physicochemical property of lignin. Then, the application research of lignin in the field of ...

Lignin and its carbon derivatives: Synthesis techniques and their

Lignin, a complex phenolic polymer abundantly present in the papermaking and biofuel industries, stands out as a cost-effective, plentiful, and non-toxic material. In recent ...



Insights into activators on biomass-derived carbon-based

...

In addition, advanced computational models can optimize biomass-derived carbon-based supercapacitor design and activity, enhancing energy storage capabilities. ...

Polyaniline decorated salt activated phenolic resin/PAN-based carbon

Polyaniline (PANI) decorated salt-activated phenolic resin (PR)/polyacrylonitrile (PAN)-based carbon nanofibers (PANI/CNFs) were fabricated by the consecutive solution ...



Spatial configuration engineering of phenolic resins to tune the ...

Tuning closed pores is crucial for achieving high-performance hard carbon (HC) anodes. However, achieving effective modulation of closed pores in phenolic resin (PF) ...

Salt-activated phenolic resin/PAN-derived core-sheath

...

In this study, we have fabricated the phenolic resin (PR)/polyacrylonitrile (PAN) blend-derived core-sheath nanostructured carbon nanofibers (CNFs) via one-pot solution ...



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