Functional materials for energy storage

In addition to their conventional uses, metal-organic frameworks (MOFs) have recently emerged as an interesting class of functional materials and precursors of inorganic materials for ...

When porous carbons are used as energy storage materials, good electrical conductivity, suitable surface chemistry, large specific surface area and porosity are the key factors to improve the storage capacity and stability of energy storage devices. ... Advanced Functional Materials, 2016, 26: 1365-1374. [53] Bai W L, Zhang Z, Chen X, et al ...

Carbon-based functional materials represent the most investigated ORR catalysts and electrode materials for the energy conversion and storage because they not only exhibit excellent electrochemical activity but also have other advantages, including low costs, long durability, and environmental friendliness (22-28).Typically, transition metal-coordinating N/C ...

One-dimensional carbon-based nanomaterials (CNMs) are ideal electrode materials because of their special uniform structure and fine scale, which make them have the characteristics of directional electron and ion transport [20, 21].Electrospinning is an effective method for preparing one-dimensional CNMs [22].Electrospinning-derived functional carbon ...

In recent years, Prussian blue analogue (PBA) materials have been widely explored and investigated in energy storage/conversion fields. Herein, the structure/property correlations of PBA materials as host frameworks for various charge-carrier ions (e.g., Na +, K +, Zn 2+, Mg 2+, Ca 2+, and Al 3+) is reviewed, and the optimization strategies to achieve ...

Advanced Functional Materials, part of the prestigious Advanced portfolio and a top-tier materials science journal, publishes outstanding research across the field. Abstract For an ideal electrostatic energy storage dielectric capacitor, the pursuit of simultaneously high energy density and efficiency presents a formidable challenge.

Up to now, numerous researchers have utilized different functional materials, including two-dimensional (2D) materials, MXenes, metal oxides, metal phosphides, metal sulfides, metal-organic frameworks, etc., as the active materials for energy-harvesting, storage, and conversion systems.

Different proficient functional materials frequently employed in PENGs/TENGs (for mechanical energy harvesting/conversion) and supercapacitors/batteries (for electrochemical energy conversion and subsequent storage) along with the individual functional mechanism of each energy-harvesting/storage systems are highlighted concisely.

Advanced Functional Materials, part of the prestigious Advanced portfolio and a top-tier materials science journal, publishes outstanding research across the field. ... graphene has been demonstrated as a key component in electrochemical energy storage technologies. However, the unique roles of graphene beyond traditional carbon in energy ...

3 · Over the last decade, there has been significant effort dedicated to both fundamental research and practical applications of biomass-derived materials, including electrocatalytic energy conversion and various functional energy storage devices. Beyond their sustainability, eco-friendliness, structural diversity, and biodegradability, biomass-derived materials provide ...

Advanced Functional Materials, part of the prestigious Advanced portfolio and a top-tier materials science journal, publishes outstanding research across the field. Abstract Semiconducting quantum dots (QDs) have received ...

[12, 13] Compared to the conventional energy storage materials (such as carbon-based materials, conducting polymers, metal oxides, MXene, etc.), nanocellulose is commonly integrated with other electrochemically active materials or pyrolyzed to carbon to develop composites as energy storage materials because of its intrinsic insulation ...

Keywords Carbon composite material; Energy conversion and storage; Catalysis; Photoelectric conversion 1 Introduction Functional carbon-based composite materials have shown great potential in various domains, such as energy conversion and storage, because of the merits of abundant microstructures, excellent stability and low cost.

Through innovative approaches, such as tailored material design, novel synthesis methods, and device integration strategies, researchers are advancing the frontier of organic materials for energy conversion applications, thereby driving the transition toward more sustainable and ...

This issue will focus on functional materials with specific electrical, thermal, magnetic, chemical, or electrochemical properties as a foundation for designing and fabricating new, desired materials enabling high-performance energy storage and conversion devices. Dr. Sima Aminorroaya Yamini Guest Editor. Manuscript Submission Information

Herein, an up-to-date account of the recent advancements in nanocellulose-derived functional materials and their emerging applications in areas of chiral photonics, soft actuators, energy storage, and biomedical science is provided. The fundamental design and synthesis strategies for nanocellulose-based functional materials are discussed.

Carbon-based functional materials represent the most investigated ORR catalysts and electrode materials for the energy conversion and storage because they not only ...

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The performance of electrochemical energy storage devices is significantly influenced by the properties of key component materials, including separators, binders, and electrode materials. ... process is essential for achieving the reticulate structure and generating a significant quantity of O-containing functional groups on the material"s ...

In order to achieve a paradigm shift in electrochemical energy storage, the surface of nvdW 2D materials have to be densely populated with active sites for catalysis, metal nucleation, organic or metal-ion accommodation and transport, and redox - charge storage (from both metals cations and anions), and endowed with pronounced chemical and ...

Energy storage and conversion are vital for addressing global energy challenges, particularly the demand for clean and sustainable energy. Functional organic materials are gaining interest as ...

This Issue will focus on functional materials with specific electrical, thermal, magnetic, chemical, or electrochemical properties as a foundation for designing and fabricating new, desired materials enabling high performance energy storage and conversion devices. Assoc. Prof. Sima Aminorroaya Yamini Guest Editor. Manuscript Submission Information

Up to now, numerous researchers have utilized different functional materials including two-dimensional (2D) materials, MXenes, metal oxides, metal phosphides, metal sulfides, metal-organic framework, etc., as the active materials for energy harvesting, storage, and conversion systems.

Most synthetic materials used in water treatment and energy storage are nonbiodegradable and nonrenewable, causing the generation of massive electronic wastes and discarded separation materials. Sodium alginate (SA) has the features of abundant sources, low cost, renewability, and biodegradability. To achieve sustainable development and minimize ...

Multi-functional polymer gel materials based on thermal phase change materials (PCMs) are rapidly advancing the application of thermal energy storage (TES) in energy-saving buildings. In this work, we report multi-functional PCM composites with anti-liquid leakage, shape memory, switchable optical transparency, and thermal energy storage. Due to the excellent ...

Advanced Functional Materials, part of the prestigious Advanced portfolio and a top-tier materials science journal, publishes outstanding research across the field. Abstract Thermal energy storage technologies based on phase-change materials (PCMs) have received tremendous attention in recent years. These materials are capable of reversibly ...

Pristine metal-organic frameworks (MOFs) are built through self-assembly of electron rich organic linkers and electron deficient metal nodes via coordinate bond. Due to the unique properties of MOFs like highly tunable frameworks, huge specific surface areas, flexible chemical composition, flexible structures and a large volume of pores, they are being used to ...

Functional materials for energy storage

Functional materials are commonly used in modern technology for applications such as energy storage and conversion (e.g., batteries and solar cells), electronics (e.g., semiconductors and sensors), smart materials for adaptive structures, and ...

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