

Heat treatment carbonization of MOFs allowed the metal oxides to be well-distributed on the porous carbon framework. This structure provided more pathways for fleetly electron transfer and increased the active site of the Faraday reaction. ... Flexible membrane electrodes can be used in flexible energy storage devices.

With the swift advancement of the wearable electronic devices industry, the energy storage components of these devices must possess the capability to maintain stable mechanical and chemical properties after undergoing multiple bending or tensile deformations. This circumstance has expedited research efforts toward novel electrode materials for flexible ...

Flexible metal-organic frameworks (MOFs) have gradually attracted much attention due to their reversible structural changes and flexible structural responses. The basic research of flexible MOFs is to study their dynamic responses under different external stimuli and translate the responses into applications. Most research studies on flexible MOFs focus on gas ...

Lignin has gained extensive attention as an ideal carbon precursor due to its abundance and high carbon content. However, the agglomeration of lignin and additional corrosive and unrecyclable reagents in direct pyrolysis still limit the development of lignin-based porous carbons. Herein, a facile and eco-friendly strategy was proposed to fabricate ...

Synthesis and the electrochemical energy storage of porous biomass carbon from corn stalk [J]. *Applied Chemistry*, 2019, 36(11): 1323-1332. [7] ZHOU J, CHENG J, WANG B, et al. Flexible metal-gas batteries: a potential option for next-generation power accessories for wearable electronics [J]. *Energy & Environmental Science*, 2020, 13(7): 1933-1970.

Flexible energy storage devices are becoming indispensable new elements of wearable electronics to improve our living qualities. As the main energy storage devices, lithium-ion batteries (LIBs) are gradually approaching their theoretical limit in terms of energy density. In recent years, lithium metal batteries (LMBs) with metallic Li as the anode are revived due to ...

Metal-organic frameworks (MOFs), representing a novel class of porous materials, feature unique pore structure, such as exceptional porosity, tunable pore structures, ...

Chen et al. review the recent advances in thermal energy storage by MOF-based composite phase change materials (PCMs), including pristine MOFs and MOF composites and their derivatives. They offer in-depth insights into the correlations between MOF structure and thermal performance of composite PCMs, and future opportunities and challenges associated ...

Flexible porous framework for energy storage

There is an increasing demand of high safety, high energy density and low cost energy storage device for wearable or flexible electronics. In this aspect, aqueous zinc-ion batteries (ZIBs) have ...

Reassuringly, COF material is a class of crystalline porous materials with two-dimensional topology formed by p-conjugated building units connected by covalent bonds [22] have a wide range of applications in the fields of gas adsorption [23], separation [24], non-homogeneous catalysts [25], energy storage materials [26], and biopharmaceutical delivery ...

This study introduces a novel design concept for eco-friendly flexible energy storage devices by integrating MXene with SW, demonstrating a promising pathway for developing sustainable and effective energy storage solutions. ... We hypothesize that SW can serve as a flexible porous framework to improve the contact area of active materials ...

To solve these issues and realize flexible sodium ion-based energy storage devices, researchers have electrospun many types of flexible nanofibers with active materials ...

Next, the applications of MOF/polymer nanofibrous membranes in energy storage and environmental protection are summarized at length. ... tunable pore size and flexible framework structures ... Long Z, Li R, Shi C, Qiao H, Wang K, et al. Metal-organic framework-structured porous ZnCo₂O₄/C composite nanofibers for high-rate lithium-ion ...

The diversity in the porous structure is expected to provide a versatile platform for creating high-performance electrodes in various energy storage applications. However, precise control of the pore parameters in a polymer is hardly possible because of the uncontrollable nature of polymerization processes.

Efficient charge storage is a key requirement for a range of applications, including energy storage devices and catalysis. Metal-organic frameworks are potential materials for efficient charge ...

It was revealed that during the thermal carbonization process, the organic linkers would be converted to carbon while maintaining the porous framework, with the formation of Co-N_x units uniformly distributed in the carbon framework. The porous carbon framework with Co-N_x sites, which have been considered as an effective electrochemical ...

Metal organic framework (MOF) is the preferred template for the preparation of porous nanostructures; we have synthesized Ni₃S₄/CoS nanosheet arrays in situ on carbon fiber based on MOF-Co. The synthesis process involves simple MOF-Co nanoarray growth, ion exchange/etching, and sulfurization reaction. The as-prepared Ni₃S₄/CoS shows porous ...

Phase change materials (PCMs) have been extensively explored for latent heat thermal energy storage in

advanced energy-efficient systems. Flexible PCMs are an emerging class of materials that can withstand certain deformation and are capable of making compact contact with objects, thus offering substantial potential in a wide range of smart applications.

Polymers can be modified into skeleton or porous framework to act as excellent supporting materials for core phase change materials. ... another research focus shall lie in fabrication of multifunctional flexible and smart thermal energy storage system with phase change composites, which can be realized in conjunction with the optimized ...

This review is intended to provide strategies for the design of components in flexible energy storage devices (electrode materials, gel electrolytes, and separators) with the ...

Covalent organic frameworks (COFs), with large surface area, tunable porosity, and lightweight, have gained increasing attention in the electrochemical energy storage realms. In recent years, ...

1. Introduction. To address the prospective demand for portable and adaptable cutting-edge electronics, next-generation affordable, flexible, lightweight, inexpensive, and renewable storage systems are urgently desired [1]. Advancements in rechargeable batteries and electrochemical supercapacitors have made us capable to counter the growing energy ...

The MOF thin films play vital role in energy storage and conversion devices as these films possess diversity in topological structures along with flexible properties, providing ...

In the pursuit of advancing materials for methane storage, a critical consideration arises given the prominence of natural gas (NG) as a clean transportation fuel, which holds substantial potential for alleviating the strain on both energy resources and the environment in the forthcoming decade. In this context, a novel approach is undertaken, employing the rigid ...

Metal-organic framework derived porous flakes of cobalt chalcogenides (CoX, X = O, S, Se and Te) rooted in carbon fibers as flexible electrode materials for pseudocapacitive energy storage ... fabricated by using these powder materials with inactive binders are difficult to adapt to the development of flexible energy storage devices [[11], [12] ...

The modified flexible balsa wood was synthesized and applied in energy storage. o Methane hydrate induction time was reduced by ~88% and the storage capacity was enhanced to 150.6 v/v. The 400 wt% water loaded case exhibited the best storage performance.

Binder-free metal-organic framework (MOF) nanoarrays and/or MOF-derived nanoarrays with high surface area and unique porous structure have emerged with great potential in energy storage ...

Flexible porous framework for energy storage

Abstract Natural-drying graphene aerogel (GA) with hierarchical porous framework architecture has been prepared, providing excellent mechanical and electrochemical properties. When used as electrode material for supercapacitors, GA achieves excellent capacitance of 240 F g⁻¹ at a current density of 0.2 A g⁻¹. Also, GA can provide a high energy ...

Metal-organic framework composites for energy conversion and storage, Hang Wang, Na Zhang, Shumin Li, Qinfei Ke, Zhengquan Li, Min Zhou ... limit their practical applications for energy-storage devices powering flexible electronics. It can construct flexible supercapacitor with high mechanical and chemical stability by introducing flexible ...

Most research and development efforts in the energy sector are currently focused on creating flexible, inexpensive, lightweight, wearable electronics that are also environmentally friendly and have a long lifetime. Supercapacitors (SCs) are appealing among portable power storage devices. The electrode material, its morphology, and fabrication procedures ...

However, there is still a long way to go to realize commercial application of binder-free nanostructured nanoarrays. To practically use them in flexible electrochemical energy storage devices, the substrate needs to be cost-effective and possesses good conductivity, high electrochemical stability and thermal stability, as well as good elasticity; while the active ...

Metal organic frameworks as hybrid porous materials for energy storage and conversion devices: A review. ... it becomes very important to modify the chemical and physical properties of materials in a very flexible way ... porous Carbon framework was synthesized using salt recrystallization process taking HKUST-1 as template and the ...

Flexible Energy Storage Systems Based on Electrically Conductive Hydrogels Wei Zhang^{1,*}, Pan Feng¹, ... as the supporting framework for in situ polymerization of the second conductive polymeric network (Figure 2, Approach 2). ... construct a crosslinked hydrogel network with a super-porous architecture. Another ECH example is the polyaniline ...

This study provides a new pathway for the development of next generation sustainable and flexible energy storage devices based on COFs and cellulose materials. Graphical abstract. Download: Download high-res ... Selective molecular sieving in self-standing porous covalent-organic-framework membranes. Adv. Mater., 29 (2016), Article 1603945 ...

Apart from the large volume changes of Li and S can be alleviated by the flexible 3D porous structure during cycling, the oxygen groups and rich mesopores are able to tune the ...

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Flexible porous framework for energy storage

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