

# Materials for electrochemical energy storage





## Overview

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This work focuses on the use of carbon materials for both batteries and supercapacitors, including insights into the mechanisms of electrochemical energy storage.

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Polymers are the materials of choice for electrochemical energy storage devices because of their relatively low dielectric loss, high voltage endurance, gradual failure mechanism, lightweight, and ease of processability.

In this review, we highlight the emerging potential of hybrid materials in energy storage applications, particularly as electrode and electrolyte materials. We describe model hybrid energy storage materials composed of organic and inorganic constituents.

In energy storage systems, CBMs make electrodes, separators, current collectors, films, and filtration membranes, mainly in SCs, combining them with other materials to form composites.

The objective of this Topic is to set up a series of publications focusing on the development of advanced materials for electrochemical energy storage technologies, to fully enable their high performance and sustainability, and eventually fulfil their mission in practical energy storage applications.



## Materials for electrochemical energy storage

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### Applications of doped-MXene-based materials for electrochemical energy

With rapidly booming modern electronics and sustainable energy-related sources, electrochemical energy storage systems (e.g., rechargeable batteries (RCBs) and ...

### Novel Electrochemical Energy Storage Devices: Materials, ...

Several kinds of newly developed devices are introduced, with information about their theoretical bases, materials, fabrication technologies, design considerations, and implementation presented.



### Mesoporous Materials for Electrochemical Energy Storage and ...

Developing high-performance electrode materials is an urgent requirement for next-generation energy conversion and storage systems. Due to the exceptional features, ...

### Electrode material-ionic liquid coupling for electrochemical energy storage

The development of efficient, high-energy and high-power electrochemical energy-storage devices requires a systems-level holistic

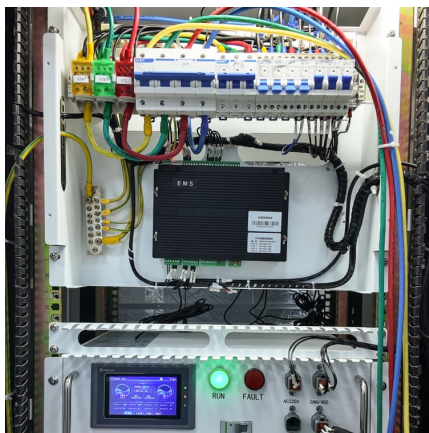


approach, rather than focusing on the ...



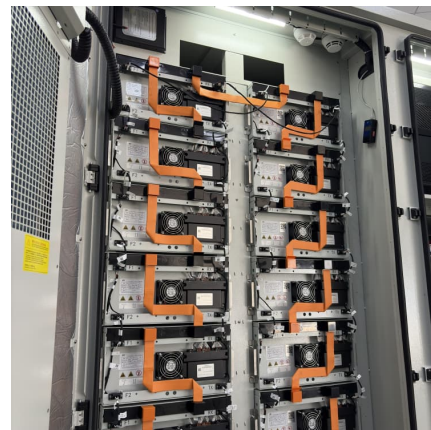
### Materials and design strategies for next-generation energy storage...

This review also explores recent advancements in new materials and design approaches for energy storage devices. This review discusses the growth of energy materials ...



### Advances and perspectives of ZIFs-based materials for electrochemical

The design and preparation of electrode materials are of great significance for improving the overall performance of energy storage devices. Zeolitic ...



### Recent advances in 3D printed electrode materials for electrochemical

Electrochemical energy storage (EES) systems like batteries and supercapacitors are becoming the key power sources for attempts to change the energy dependency from ...





### **Nanostructured energy materials for electrochemical energy ...**

Nanostructured materials have received tremendous interest due to their unique mechanical/electrical properties and overall behavior contributed by the complex synergy of ...



### [Electrochemical Energy Storage Materials](#)

The objective of this Topic is to set up a series of publications focusing on the development of advanced materials for electrochemical energy storage technologies, to fully ...

### **Recent advances in porous carbons for electrochemical energy storage**

Porous carbons are widely used in the field of electrochemical energy storage due to their light weight, large specific surface area, high electronic conductivity and structural ...



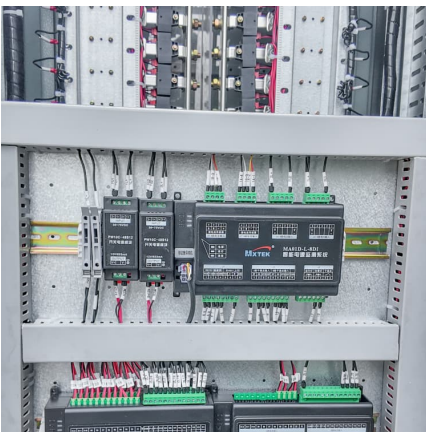
### [2 D Materials for Electrochemical Energy Storage: ...](#)

Electrochemical energy storage is a promising route to relieve the increasing energy and environment crises, owing to its high efficiency and ...



### Hierarchical 3D electrodes for electrochemical energy storage

The discovery and development of electrode materials promise superior energy or power density. However, good performance is typically achieved only in ultrathin electrodes ...



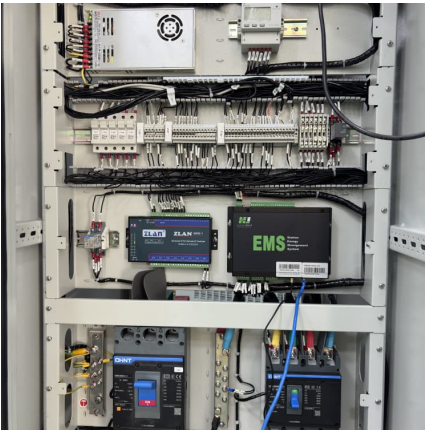
### Advanced Materials for Electrochemical Energy Conversion and Storage

The present special issue is focused on recent developments in electrocatalytic materials for energy storage and conversion devices. It brings the latest advances in the ...

### [Electrochemical energy storage performance of 2D](#)

However, in regard to electrochemical applications, chemically synthesized 2D material-based heterostructures still suffer from an intrinsic restacking tendency, which limits ...



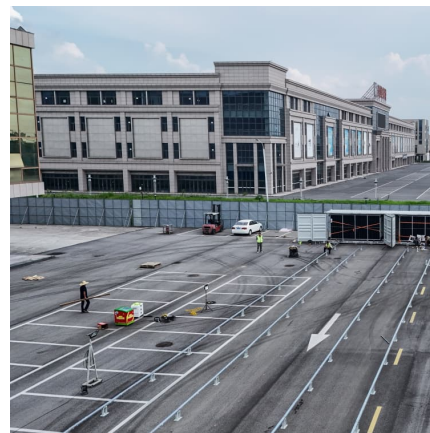


### **High Entropy Materials for Reversible Electrochemical ...**

High entropy materials have garnered considerable attention recently as a class of materials with intricate stoichiometry, exhibiting high ...

### [The role of graphene for electrochemical energy storage](#)

Graphene is potentially attractive for electrochemical energy storage devices but whether it will lead to real technological progress is still unclear. Recent applications of ...



### **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 ...

### [Methods and Protocols for Electrochemical Energy ...](#)

We present an overview of the procedures and methods to prepare and evaluate materials for electrochemical cells in battery research in our laboratory, ...



### Materials for Electrochemical Energy Storage: Introduction

Polymers are the materials of choice for electrochemical energy storage devices because of their relatively low dielectric loss, high voltage endurance, gradual failure mechanism, lightweight, ...



### [High-entropy materials for electrochemical energy ...](#)

In this review, we summarize the recent progress on the HEMs related to their electrochemical energy storage applications. Firstly, the concept of HEMs will ...



### [High-entropy materials for electrochemical energy ...](#)

With the limited resources of fossil fuels and their related environmental issues, the rapid development of alternative energy sources is required.<sup>79-81</sup> This will ...





### [Nanomaterials for electrochemical energy storage](#)

Depleting fossil-fuel resources and ever-growing energy needs require the pursuit of green energy alternatives, including both sustainable storage technologies and renewable ...



### [Nanotechnology for electrochemical energy storage](#)

Adopting a nanoscale approach to developing materials and designing experiments benefits research on batteries, supercapacitors and hybrid devices at all ...

### [Carbon-Based Materials for Energy Storage Devices: ...](#)

The urgent need for efficient energy storage devices (supercapacitors and batteries) has attracted ample interest from scientists and researchers in ...



### **Recent progress of pitch-based carbon materials for electrochemical**

With the increasing demand for energy and the ongoing depletion of fossil fuels, the development of novel electrochemical energy storage devices has become an urgent ...



### [Harnessing Nature-Derived Sustainable Materials for ...](#)

In energy storage systems, CBMs make electrodes, separators, current collectors, films, and filtration membranes, mainly in SCs, combining them with other materials to form composites.



### **Progress and challenges in electrochemical energy storage ...**

In this review article, we focussed on different energy storage devices like Lithium-ion, Lithium-air, Lithium-Zn-air, Lithium-Sulphur, Sodium-ion rechargeable batteries, ...

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