MICRO-NANO ENERGY STORAGE MATERIALS


This Research Topic seeks the latest research and development of micro/nano materials for efficient energy storage and conversion. All types of articles, including Original Research articles, Methods, Review, Mini Review, Perspective, Data Report, and Brief Research Report, are welcome in the following, but are not limited to, research areas:


As the core of electrochemical energy technologies, materials with different microscopic chemical molecular structure and the physical micro/nano structure have received tremendous interest due to their unique mechanical/electrical and interfacial properties, which are the keys to realize the efficient and effective energy conversion and storage.


These characteristics allow for their integration with conventional energy storage materials, enabling the fabrication of cellulose composite electrodes with tunable structures and properties. 4. In this composite, cellulose micro/nano-fibers served as the matrix, while MXene nanosheets and AgNWs were employed as functional additives to


A practical and effective approach to increase the energy storage capacity of lithium ion batteries (LIBs) is to boost their areal capacity. [26, 36] Therefore, engineering nano-sized materials with micro-sized structure is an effective strategy to design thick electrodes. The morphologies of the thick electrodes were studied using scanning


The traditional energy storage devices with large size, heavy weight and mechanical inflexibility are difficult to be applied in the high-efficiency and eco-friendly energy conversion system. 33,34 The electrochemical performances a?|

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Recently, the applications of micro/nano materials in energy storage and conversion fields, including lithium batteries, metal-ion batteries, water splitting, photocatalytic reactions, and electrochemical catalysis, have been widely investigated (Dai L. et al., 2015; a?|

Bahari et al. [137] evaluated the impact of nanocomposite energy storage on the performance of a solar dryer. The energy storage material was made by adding aluminum oxide with a volume fraction of 0.5 wt%, 1 wt%, and 1.5 wt% in the paraffin. The nano/PCM was poured into the steel tubes to raise the efficiency of the solar dryer.

With advancement in technologya??nanotechnology, various thermal energy storage (TES) materials have been invented and modified with promising thermal transport properties. Solid-liquid phase change materials (PCMs) have been extensively used as TES materials for various energy applications due to their highly favourable thermal properties.

The theory of obtaining high energy-storage density and efficiency for ceramic capacitors is well known, e.g. increasing the breakdown electric field and decreasing remanent polarization of dielectric materials. This nano-micro engineering results in a high energy density of 13.5 J cm a??3 together with a This material design strategy

Provides special emphasis on the energy storage, propellant and defense applications; Discusses challenges and future perspectives for the field; Part of the book series: Energy, Environment, and Sustainability (ENENSU) nano-energetic materials, micro and nanofabrication technologies, water remediation using visible light photocatalysis and

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New materials hold the key to advances in energy conversion and storage. Nanoscale materials possess nanoscale (1a??100 nm) structures externally or internally 1; in particular they offer unique properties that are central for the energy transition in our society from heavily relying on fossil fuels to renewable energy sources. 2 While realizing there are other a?|

In latent heat energy storage systems, a solid-liquid phase transition process can be nano-engineered to improve the latent heat of phase change or increase the heat transfer rate in either state. 78, 79 Material compatibility, thermal stability, and chemical stability of PCM usually determine its life span. 80 Particularly, it is desirable to

The architectural design of electrodes offers new opportunities for next-generation electrochemical energy storage devices (EESDs) by increasing surface area, thickness, and active materials mass loading while maintaining good ion diffusion through optimized electrode tortuosity. However, conventional thick electrodes increase ion diffusion a?|

This review presents the recent progress on microfluidic fabrications of green micro-/nano-functional materials applied in the fields of environmental remediation and energy storage, and explains fundamental mechanisms of different multiphase flow regimes in various channel configurations. Download: Download high-res image (185KB)

The development of a nation is deeply related to its energy consumption. 2D nanomaterials have become a spotlight for energy harvesting applications from the small-scale of low-power electronics to a large-scale for industry-level applications, such as self-powered sensor devices, environmental monitoring, and large-scale power generation. Scientists from around the world a?|

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Enhancement in properties of thermal storage materials improves their performance and contributes to reducing the greenhouse gas emissions. The enhancement can be made in a passive way, which is cost-effective and hardly requires management. For decades, phase change materials (PCMs) have been used in many applications for thermal storage, a?|

Therefore, the design of cost-saving and highly efficient micro/nano materials in the field of energy storage and conversion is still very significant. Numerous papers have been reported in this Research Topic, and herein we introduce the representative advances in the collected papers that discuss how micro/nano materials work in the area of

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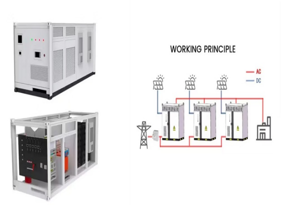
An overview of recent literature on the micro- and nano-encapsulation of metallic phase-change materials (PCMs) is presented in this review to facilitate an understanding of the basic knowledge, selection criteria, and classification of commonly used PCMs for thermal energy storage (TES). Metals and alloys w

In recent years, using micro/nano MOFs as potential materials platforms for designing advanced electrodes and catalysts to achieve high-density energy storage or high-efficiency energy conversion has become a very hot research topic [116].

Dalai et al. have utilized the waste amber-colored glass frit and borosilicate glass to prepare HGMs. Figure 23.2 shows the scanning electron image of HGMs produced from glass feed by flame spraying method (Dalai et al., 2014b).The doping effect of various metals like magnesium (Mg) (Dalai et al., 2014a), iron (Fe) (Dalai et al., 2014a), cobalt (Co) (Dalai et al., 2014c), and a?|



This review provides a comprehensive overview of the progress in lighta??material interactions (LMIs), focusing on lasers and flash lights for energy conversion and storage applications. We discuss intricate LMI parameters such as light sources, interaction time, and fluence to elucidate their importance in material processing. In addition, this study covers a?|

Several emerging energy storage technologies and systems have been demonstrated that feature low cost, high rate capability, and durability for potential use in large-scale grid and high-power applications. Owing to its outstanding ion conductivity, ultrafast Na-ion insertion kinetics, excellent structural stability, and large theoretical capacity, the sodium a?|

So in this paper, a rod-like micro/nano structure was constructed and its effect on the electrochemical energy storage performance of LMCMs was researched. Initially, the MnO 2 sample resembling a rod was fashioned through hydrothermal means, with the hydrothermal reaction conditions (temperature and raw material ratio) regulated. Then, the

Nano-Micro Letters - High-entropy materials represent a new category of high-performance materials, first proposed in 2004 and extensively investigated by researchers over the past two decades. In recent years, researchers have directed their attention toward electrode materials for energy storage and conversion. Initially, they focused on

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The focus of the special issue will be on the fascinating field of micro/nano energy. This encompasses not only the application of micro/nanoparticles for enhancing the performance of energy systems, but also the examination of energy systems at a micro scale, such as micro turbines and micro combustors. The overarching objective of this special issue a?|


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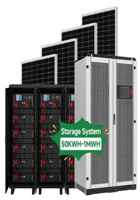

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For example, a unique 3D hierarchical porous sponge-like VO 2 (B)@C micro/nano-structure was controllably synthesized, and delivered the excellent electrochemical performance in terms of large capacity, long cycling and high a?|


In response to global energy problems, industrial waste heat storage systems are a useful strategy as important as clean energy. Slow magnesium oxide hydration rate and incomplete hydration are the main obstacles to the application of MgO/Mg(OH) 2 to heat storage systems. In this study, porous structures are introduced into pure magnesium oxide materials a?|

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Rechargeable metal ion batteries (MIBs) are one of the most reliable portable energy storage devices today because of their high power density, exceptional energy capacity, high cycling stability, and low self-discharge [1, 2].Lithium-ion batteries (LIBs) remain the most developed and commercially viable alternative among all rechargeable batteries, and graphite a?|