

Materials possessing these features offer considerable promise for energy storage applications: (i) 2D materials that contain transition metals (such as layered transition metal oxides 12 ...

Advanced Functional Materials, part of the prestigious Advanced portfolio and a top-tier materials science journal, publishes outstanding research across the field. Abstract The rapid developments of the Internet of Things (IoT) and portable electronic devices have created a growing demand for flexible electrochemical energy storage (EES) devices.

With many apparent advantages including high surface area, tunable pore sizes and topologies, and diverse periodic organic-inorganic ingredients, metal-organic frameworks (MOFs) have been identified as versatile precursors or sacrificial templates for preparing functional materials as advanced electrodes or high-efficiency catalysts for electrochemical ...

3 ???· Over the last decade, there has been significant effort dedicated to both fundamental research and practical applications of biomass-derived materials, including electrocatalytic ...

Discover pioneering research at the University of Sydney on functional energy materials, shaping the future of clean and efficient energy technologies. ... Advanced materials for energy generation, storage and conversion Our research focuses on (nano)materials, such as MOFs, ionic liquids and solids, and polymers for a wide range of ...

For rechargeable batteries, metal ions are reversibly inserted/detached from the electrode material while enabling the conversion of energy during the redox reaction [3].Lithium-ion batteries (Li-ion, LIBs) are the most commercially successful secondary batteries, but their highest weight energy density is only 300 Wh kg⁻¹, which is far from meeting the ...

Thermal energy storage (TES) has received significant attention and research due to its widespread use, relying on changes in material internal energy for storage and release [13]. TES stores thermal energy for later use directly or indirectly through energy conversion processes, classified into sensible heat, latent heat, and thermochemical ...

MXene materials can not only be used directly as electrode materials but can also be used as functional materials to solve problems such as poor conductivity of electrode materials, severe volume expansion, dendrites, and dissolution of electrode materials. ... The future trajectory of MXene materials in energy storage encompasses innovative ...

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.

Energy Storage Materials is an international multidisciplinary journal for communicating scientific and technological advances in the field of materials and their devices for advanced energy ...

Since graphene was first experimentally isolated in 2004, many other two-dimensional (2D) materials (including nanosheet-like structures), such as transition metal oxides, dichalcogenides, and ...

Chapter 2 - Advanced functional materials and devices for energy conversion and storage applications. Author links open overlay panel Anirban Maitra, Sumanta Bera, Lopamudra Halder, Bhanu ... Such electrochemical energy storage devices are apparently convenient in respect to several features, like fast charging, higher power density, longer ...

With the purpose of pursuing an even higher energy density for rechargeable batteries, alternative electrode materials with different electrochemical mechanisms other than the intercalation of Li ions have been extensively investigated in recent years [5], [6], [7]. Among them, using elemental sulfur as a cathode material to directly react with lithium metal is especially ...

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 ...

Energy storage materials are eco-friendly, and Ni-rich cathode materials have been confirmed to exhibit high capacity and high performance. Research has been extensively conducted to improve the characteristics of NCM and NCA, which are increasingly used industrially. ... Special functional material technology, Material & Components Technology ...

Given that energy storage occurs only at the surfaces of the electrodes, porous electrode materials with high-surface areas are necessary. Fig. 6 Strategies employing MOFs within supercapacitor ...

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