

Materials for a new revolution in energy storage

Although the number of studies of various phenomena related to the performance of nanomaterials in energy storage is increasing year by year, only a few of them--such as graphene sheets, carbon nanotubes (CNTs), carbon black, and silicon nanoparticles--are currently used in commercial devices, primarily as additives (18).

In energy storage systems, nature-inspired nanomaterials have been highly anticipated to obtain the desired properties. Such nanostructures of nature-inspired nanomaterials include porous carbon, metal oxides/sulfides/phosphides/selenides/hydroxides, and others that have shown exemplary performance in electrochemical energy storage devices.

Silicon-based energy storage systems are emerging as promising alternatives to the traditional energy storage technologies. This review provides a comprehensive overview of the current state of research on silicon-based energy storage systems, including silicon-based batteries and supercapacitors.

The diversity of materials for current lithium-based batteries suggest that, unlike solar photovoltaics or wind turbines, it is likely new material advances in storage technologies ...

Silicon nanostructures for solid-state hydrogen storage: A review. Int J Hydrogen Energy Pomerantseva E, Bonaccorso F, Feng X, Cui Y, Gogotsi Y (2019) Energy storage: The future enabled by nanomaterials. Science 366 (6468):eaan8285

The development of nanomaterials and their related processing into electrodes and devices can improve the performance and/or development of the existing energy storage systems. We provide a perspective on recent progress in the application of nanomaterials in energy storage devices, such as supercapacitors and batteries.

This article discusses the unique properties of silicon, which make it a suitable material for energy storage, and highlights the recent advances in the development of silicon-based energy storage systems.

Developments in carbon dioxide (CO₂) capture and hydrogen (H₂) storage using tunable structured materials are discussed. Design and characterization of new nanoscaled materials ...

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