Materials for energy storage and conversion

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 efficient candidates for these systems due to their abundant resources, tunability, low cost, and environmental friendliness.

The efficacy and versatility of this concept is demonstrated by the substantially enhanced capacities, improved rate capabilities, and longer life stabilities of energy storage devices,...

Accelerating the transitions to a low carbon economy calls for rigorous and relevant research in various disciplines including, among others, energy storage and conversion which are essential to face the increasing sustainability challenges tackling both global warming and energy security.

It is surprising to observe that layered materials possess: (1) high reactivity, high reversibility, and enhanced performance via forming additional chemical bonds in alkali-metal ion batteries; (2) facile phase modulation, great feasibility for in-plane/sandwich device design, and cation intercalation enabled high capacitance in supercapacitors...

New materials hold the key to fundamental advances in energy conversion and storage, both of which are vital in order to meet the challenge of global warming and the finite nature of fossil fuels.

i-MESC (Interdisciplinarity in Materials for Energy Storage and Conversion) is an Erasmus Mundus Joint Master co-funded by the European Commission from 2023 to 2029. i-MESC is an ambitious, unique and much needed 2-year MSc. programme aiming to prepare and guide, in the most complete and efficient manner, the next generation of professionals to ...

The synthesis, structure, and properties of mesoporous materials and their performance in rechargeable batteries, supercapacitors, fuel cells, and electrolyzers are discussed, providing practical details and enlightening comments on the construction of high-performance mesoporous electrodes.

Owing to the intermittent and fluctuating power output of these energy sources, electrochemical energy storage and conversion technologies, such as rechargeable batteries, electrochemical capacitors, electrolyzers, and fuel cells, are playing key roles toward efficient and sustainable energy utilization (1, 2).

Two-dimensional (2D) mesoporous materials (2DMMs), defined as 2D nanosheets with randomly dispersed or orderly aligned mesopores of 2-50 nm, can synergistically combine the fascinating merits of 2D materials and mesoporous materials, while

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