Special Issue

Advanced Battery Materials: Preparation, Optimization and Recycling

Message from the Guest Editors

Advanced battery technologies employ diverse electrode materials, electrolytes, and additives. For critical applications in electric vehicles, portable electronics, and energy storage systems, the focus lies on high-capacity cathodes, durable anodes, and novel electrolytes. These encompass transition metal oxides, carbon-based materials, solid-state electrolytes, and multifunctional composites featuring intricate microstructures, such as nanostructured coatings and conductive polymer blends. Analyzing these materials—characterized by varied properties, morphologies, and sizes (e.g., lithium-ion battery electrodes)—requires consideration of electrode–electrolyte interfaces under diverse operating conditions, including charge–discharge cycles, temperature extremes, mechanical stress, and voltage fluctuations. This Special Issue aims to elucidate the fundamental principles governing material synthesis, performance optimization, and recycling processes. Crucially, macroscopic properties such as energy storage capacity and cycle stability are governed by underlying mechanisms operating across multiple sub-observational scales.

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Message from the Editor-in-Chief

Materials (ISSN 1996-1944) was launched in 2008. The journal covers twenty-five comprehensive topics: biomaterials, energy materials, advanced composites, advanced materials characterization, porous materials, manufacturing processes and systems, advanced nanomaterials and nanotechnology, smart materials, thin films and interfaces, catalytic materials, carbon materials, materials chemistry, materials physics, optics and photonics, corrosion, construction and building materials, materials simulation and design, electronic materials, advanced and functional ceramics and glasses, metals and alloys, soft matter, polymeric materials, quantum materials, mechanics of materials, green materials, general. *Materials* provides a unique opportunity to contribute high quality articles and to take advantage of its large readership.

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