Special Issue

Material Advancements and Challenges in Next-Generation Lithium-Ion Batteries

Message from the Guest Editors

Lithium-ion batteries (LIBs) have become indispensable in modern life due to their exceptional energy density, long lifespan, and high safety standards. However, current battery systems do not fully meet the demands of electric vehicles, electrochemical energy storage, and other applications, particularly regarding safety and energy density. Thus, developing next-generation lithium-based batteries is essential. The aim of this Special Issue is to present recent advancements in materials and processes that contribute to the creation of sustainable energy storage systems and environmental solutions. The main topics are as the following:

- Solid-state electrolytes: inorganics (oxide ceramics, sulfides, and halides) and polymers (electrolytes, gels, and ionomers);
- Electrolytes and additives: new salt solvents and additives that enable enhanced safety or higher-energy-density electrodes and high-voltage electrolytes;
- Cathode materials: Ni-rich cathodes, composite cathodes, disordered cathodes, and high-entropy cathodes;
- Anode materials: lithium metal and protected lithium metal anodes.

Guest Editors

Dr. Mohamed Houache

Prof. Dr. Yaser Abu-Lebdeh

Dr. Zouina Karkar

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Materials
Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland
Tel: +41 61 683 77 34
materials@mdpi.com

mdpi.com/journal/materials

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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.

Editor-in-Chief

Prof. Dr. Maryam Tabrizian
1. Department of Biomedical Engineering, Faculty of Medicine and Health Sciences, McGill University, Montreal, QC H3A 2B6, Canada
2. Faculty of Dentistry and Oral Health Sciences, McGill University, 3640 Rue University, Montreal, QC H3A 0C7, Canada

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