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Special Issue Reprint

Metallic Functional Materials

Edited by: Changlong Tan, Kun Zhang and Yan Feng

Metallic functional materials have become a strategic focus of contemporary research, bridging the gap between fundamental metallurgy and device-level innovation. This Reprint addresses the rising demand for intelligent, adaptive, and high-performance systems used in the energy conversion, aerospace, and biomedical sectors. It compiles cutting-edge research that explores how advanced processing routes, such as additive manufacturing and severe plastic deformation, interact with integrated computational approaches to stabilize novel phases.

This collection places a strong emphasis on shape memory alloys and Heusler alloys. Readers will find investigations into enhancing fatigue resistance in superelastic wires through nanocrystallization, as well as studies on the cyclic stability of single crystals. This Reprint also covers significant advancements in magnetic functional materials, including terahertz metamaterial absorbers and compounds exhibiting giant magnetic entropy changes for cryogenic refrigeration. Beyond magnetic and structural properties, the text expands into energy and electronic applications. Featured studies discuss the synthesis of composite hydrogen storage materials with improved kinetics and the development of conductive silver pastes for flexible electronics. In the biomedical domain, this Reprint explores methods to regulate the elastic modulus of orthopedic implants to prevent stress shielding.

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