

Special Issue

High-Performance Aluminum Alloy: Design, Strengthening, Manufacturing and Application

Message from the Guest Editors

High-performance aluminum alloys have emerged as pivotal materials across diverse industries due to their exceptional combination of high strength, being lightweight, and superior thermal and corrosion resistance. Strengthening mechanisms, including grain growth control, work hardening, precipitation hardening, and solid solution strengthening, play critical roles in achieving optimal mechanical properties. Advanced manufacturing techniques, such as additive manufacturing, laser-based techniques, and friction stir welding, address challenges like porosity, anisotropy, and residual stress while enabling the production of complex, high-integrity components. In this Special Issue, we invite contributions focusing on the theoretical, experimental, and computational aspects of high-performance aluminum alloy design and application. Topics of interest for this Special Issue include predictive modeling for alloy development, microstructural engineering, innovative strengthening methods, and advancements in manufacturing technologies.

Guest Editors

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Metallic materials play a vital role in the economic life of modern societies; contributions are sought on fresh developments that enhance our understanding of the fundamental aspects related to the relationships between processing, properties and microstructure – disciplines in the metallurgical field ranging from processing, mechanical behavior, phase transitions and microstructural evolution, nanostructures, as well as unique metallic properties – inspire general and scholarly interest among the scientific community.

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