

Special Issue

Design, Processing, and Performance of Silicon-Based Alloys

Message from the Guest Editor

Silicon alloys are increasingly recognized as key materials in applications demanding a balance of strength, thermal stability, and lightweight characteristics. Their unique combination of mechanical, thermal, and electronic properties makes them highly suitable for sectors ranging from automotive and aerospace to semiconductors and energy systems. This Special Issue focuses on the design, development, and optimization of silicon-based alloys through advanced alloying strategies, thermodynamic modeling, and modern processing techniques.

The incorporation of silicon into metallic matrices such as aluminum and iron enables the formation of refined microstructures and tailored intermetallic phases, leading to improved wear resistance, high-temperature performance, and casting behavior.

This Special Issue welcomes original research and review articles that focus on the design, processing, and performance evaluation of silicon alloys. Of particular interest are studies highlighting novel alloy systems, computational alloy design, process–structure–property correlations, and scalable, cost-effective processing routes suitable for industrial applications.

Guest Editor

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Message from the Editorial Board

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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