

Special Issue

New Insights into Microstructure Evolution and Mechanical Properties of Steels

Message from the Guest Editors

Driven by carbon peaking and carbon neutrality goals, advanced steels are increasingly required to deliver high strength, toughness, and durability for clean energy, transportation, and infrastructure applications. Recent studies demonstrate that microstructure evolution—spanning grain refinement, phase transformation, precipitation, and grain boundary character—plays a decisive role in governing mechanical performance and service reliability. Processing routes such as thermo-mechanical control, heat treatment, and alloy design strongly couple with these microstructural features, enabling tailored property combinations. This Special Issue aims to present new insights into the relationships among processing, microstructure, and mechanical properties of steels, highlighting innovative characterization, modeling, and design strategies that advance performance optimization and sustainable manufacturing.

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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.

Editor-in-Chief

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