

SPECIAL ISSUE

# Advances in Mechanical Behavior and Microstructure Property of Metallic Alloys

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## Scope and Description

This Special Issue aims to present the latest advances in understanding the mechanical performance and underlying deformation/failure mechanisms of metallic alloys – a class of materials that underpins numerous structural and functional applications. While specific alloy systems may differ in composition and processing, the fundamental principles governing strength, ductility, fatigue, creep, and fracture are often universal. This issue seeks to bring together contributions that explore these principles through experimental, theoretical, and computational approaches.

The overarching goal is to foster a mechanistic understanding that transcends individual alloy systems, providing insights that can guide processing optimization and improve service reliability. We particularly encourage studies that combine advanced characterization with quantitative analysis, as well as works on novel alloy compositions or additive-manufactured materials.

## Topics of Interest

- **Mechanical properties:** tensile behavior, creep, fatigue and wear across a range of temperatures and strain rates.
- **Microstructural evolution:** casting, forging, heat treatment, additive manufacturing and their effects on performance.
- **Advanced characterization:** SEM/EBSD, TEM, XRD, neutron diffraction and *in situ* testing for deformation substructures, phase transformations and damage initiation.

RESEARCH THEMES

# Mechanistic Understanding, Characterization & Alloy Design

- **Multi-scale modeling:** CPFEM, phase-field and molecular dynamics approaches to predict mechanical responses and failure.
- **Environmental effects:** oxidation, corrosion and hydrogen embrittlement.
- **Alloy design strategies:** computational thermodynamics and high-throughput experimentation.

## Keywords

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| Metallic alloys<br>Mechanical properties<br>Deformation mechanisms<br>Microstructure characterization | Fatigue and fracture<br>In-situ testing<br>Multi-scale modeling<br>Alloy design |
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## Guest Editor

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## Invitation to Contribute

We invite original research and review articles that advance the understanding of mechanical behavior, deformation and failure mechanisms, microstructure-property relationships, environmental effects, and design strategies for metallic alloys. Contributions integrating advanced characterization with quantitative analysis are particularly encouraged.

SUBMIT YOUR MANUSCRIPT

[submissions@goajs.com](mailto:submissions@goajs.com)  
[www.goajs.com](http://www.goajs.com)