Special Issue

Fatigue, Fracture, and Multiaxial Integrity of Metallic Structure Materials: From Microstructure to Data-Driven Assessment

Message from the Guest Editors

Modern challenges in structural integrity call for a multidisciplinary synthesis of experimental, theoretical, and computational tools. From traditional fatigue life prediction models to data-driven techniques leveraging machine learning and big data analytics, the field is rapidly evolving to address complex geometries, scale effects, notch sensitivities, and multiaxial stress states. Furthermore, the interplay between microstructure, mechanical properties, and environmental factors necessitates a holistic understanding of failure mechanisms to optimize material selection and design.

We particularly encourage submissions that combine theoretical rigor with practical relevance, offering actionable insights for industries reliant on metallic structures. Studies addressing the interplay between microstructure, processing history, and mechanical performance are also highly welcome.

- structural integrity
- fracture mechanics
- fatigue analysis
- residual stress
- microstructure–property relationships
- multiaxial loading
- computational modeling
- high-strength steels
- lightweight alloys
- data-driven methods

Guest Editors

Prof. Dr. Jin Gan
Dr. Huabing Liu
Dr. Lei Ao

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Metals
Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland
Tel: +41 61 683 77 34
metals@mdpi.com

mdpi.com/journal/metals

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About the Journal

Message from the Editor-in-Chief

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

Prof. Dr. Yong Zhang
Beijing Advanced Innovation Center of Materials Genome Engineering, State Key Laboratory for Advanced Metals and Materials, University of Science and Technology Beijing, 30 Xueyuan Road, Beijing 100083, China

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