Special Issue

Radiation Defects in Metals and Metal-Oxide Functional Materials: Mechanisms, Control, and Applications

Message from the Guest Editor

Radiation-induced defects strongly affect the structural, mechanical, and functional properties of metals and metal-oxide materials, influencing their performance in applications from structural components to energy devices, environmental remediation, sensing, biomedicine, and advanced micro- and optoelectronics, including displays, photodetectors, plasmonics, light-emitting devices, and supercapacitors used in space or nuclear systems. Vacancies, interstitials, and their clusters or dislocations can cause voids, dislocation loops, and stacking faults, degrading macroscopic properties. Understanding defect formation, evolution, and interactions under irradiation or temperature is key to designing radiation-tolerant materials. This Special Issue welcomes contributions on experimental, theoretical, and computational studies of defect mechanisms, microstructural evolution, mitigation strategies, advanced characterization, modeling, and development of radiation-resistant alloys and composites. We invite high-quality original research, reviews, and perspectives to advance knowledge of radiation effects and guide the design of materials for extreme environments.

Guest Editor

Dr. Renata Ratajczak
National Centre for Nuclear Research, Otwock, Poland

Deadline for manuscript submissions

31 July 2026

Metals

an Open Access Journal by MDPI

Impact Factor 2.5
CiteScore 5.3

mdpi.com/si/265342

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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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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