Special Issue

Failure Mechanisms in Metallic Materials

Message from the Guest Editors

Metallic materials experience various extreme and complex conditions during their in-service condition. Irreversible deformation behaviours occur during complex conditions, manifested in localised slip, fatigue crack nucleation, short-crack propagation, and ultimate failure events. Recently, understanding their failure mechanisms has become a trending problem in a wide range of environmental, energy and aerospace applications. Significant advances have been made in microstructure-based crystal plasticity modelling and in-situ electron microscopy to quantitatively characterise the origin and evolution of failure events at small scale. Meanwhile, considerable interest has arisen in linking macroscopic properties to material microstructure across different length and time scales. Furthermore, the establishment of frameworks integrating experimentation and modelling to understand complex coupled environmental effects, such as hydrogen embrittlement, extreme high temperature, irradiation damage, and corrosion cracking, is crucial to reveal the physical mechanisms behind phenomena.

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Welcome to *Crystals*, the journal dedicated to the fascinating world of crystallographic research! Crystals are more than mere decorative elements; they hold the key to understanding the fundamental structure of matter. Our mission is to explore the crucial significance of this research across various fields. From medicine to technology, chemistry to geology, crystals play a vital role. Their structure provides insights into new advanced materials, innovative drugs, and groundbreaking technologies. Through *Crystals*, we delve into the microscopic world to discover solutions that will shape the future. Join us on a journey through the *Crystals*, where science merges with beauty and innovation.

Editor-in-Chief

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