Special Issue

Creep Behavior of Metal and Alloy

Message from the Guest Editor

Creep is the time-dependent deformation of materials under constant loads at elevated temperatures. Since early studies by Andrade and Norton, creep has remained a vital research field due to applications in turbines, aerospace engines, petrochemical reactors, and nuclear components, where mechanisms like dislocation slip/climb, diffusion, grain boundary sliding, and void formation interact under varied stress, temperature, and environments.

Creep in metals and alloys is multi-scale and multi-stage, from primary to tertiary creep, with differing mechanisms and failure modes across superalloys, steels, and refractory metals. Understanding and modeling processes from atomic-scale diffusion and dislocation dynamics to meso-scale cavity evolution and macro-scale component behavior requires integrated experimental and computational approaches. Advancing life-prediction and damage understanding is crucial for structural integrity, safety, and high-temperature manufacturing.

This Special Issue highlights advances in creep mechanisms, life-prediction models, alloy design, and manufacturing techniques to improve the safety, reliability, and durability of high-temperature components.

Guest Editor

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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

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