



# Materials Performance & Characterization

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The journal publishes high-quality, original articles, including full papers, review papers, and technical notes, on both theoretical and practical aspects of the processing, structure, properties, and performance of materials used in mechanical, transportation, aerospace, energy systems, and medical devices. These materials include metals and alloys, glass and ceramics, polymers, composite materials, textiles, and nanomaterials. The journal covers topics related to the integrity of materials which encompasses mechanical testing, fatigue and fracture, corrosion, wear, and erosion, as well as the integrity of components and systems such as rolling element bearings, piping and pressure vessels, fasteners, space technology, and nanotechnology. The journal publishes articles on both qualitative and quantitative methods used to characterize materials including all forms of microscopy, chemical analysis, and nondestructive evaluation.

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# Overview

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## Special Issue on Advances in Fatigue and Fracture Mechanics

The prevention of fatigue and fracture failures is critical to the safe operation and economic viability of machines, devices, and components across an increasingly broad spectrum, ranging from the aerospace and surface transportation, power generation, and petroleum communities to the semiconductor, biomedical, and micro-electro-mechanical systems worlds. Each of these areas presents its own particular challenges to the development and application of engineering approaches to predict the structural integrity and remaining life of critical components and systems.

Fatigue- and fracture-based methodologies invariably require models of damage initiation, damage accumulation, and failure mechanisms that operate within each of the application domains, as well as accurate characterization of the material and structural response to the combined effects of loading, loading rate, environmental conditions, and engineered or naturally occurring material heterogeneity. Fatigue and fracture models that are currently available are increasingly being stretched to their limits (and beyond), and the demand for models that are more robust, faster, adaptable, and of higher fidelity is continuous and intense.

This special issue contains 13 papers that were presented at the 15th International ASTM/ESIS Symposium on Fatigue and Fracture Mechanics held in Anaheim, CA, in May 2015. These papers, from seven countries, represent some of the most recent advancements in the understanding of fatigue and fracture. The first paper in the special edition is based on the Jerry R. Swedlow Memorial Lecture by R. C. McClung on “Integrating Fracture Mechanics Into the Material and Structural Design Process.” The remainder of the papers represent a variety of interesting developments in the field of fatigue and fracture, including advanced experimental and modeling approaches, novel analyses, and applications to structural integrity challenges.

Producing this special issue required significant efforts from authors, reviewers, editors, and the publication team, all of which are gratefully acknowledged. The editors of this issue would especially like to thank Dr. Richard Neu for his guidance and support in compiling this issue.

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