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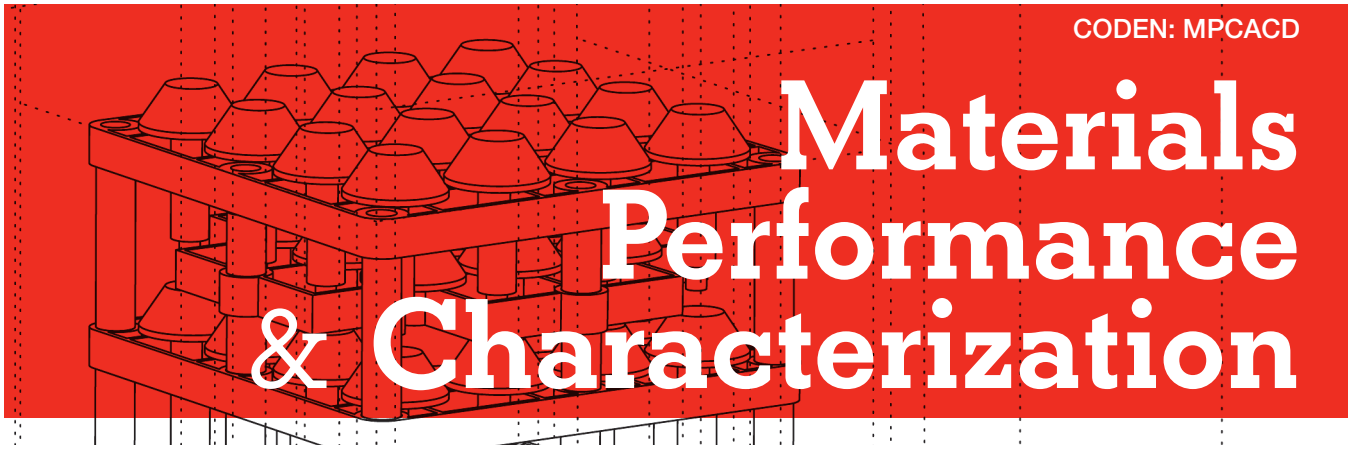

Materials Performance & Characterization

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Overview

Special Issue on Advances in Fatigue and Fracture Mechanics

Practitioners in fatigue and fracture throughout the international community gathered in Toronto, Canada, on May 10–12, 2017 for the 17th International ASTM/ESIS Symposium on Fatigue and Fracture Mechanics, which also served as the 41st ASTM National Symposium on Fatigue and Fracture Mechanics. Symposium chairs, Dr. Min Liao from the National Research Council of Canada in Ottawa, Canada and Mr. Douglas Wells from the NASA Marshall Space Flight Center in Huntsville, AL, USA, were pleased to host more than twenty-five speakers on a broad range of topics in the fatigue and fracture mechanics disciplines. Presented topics included results from experiments and simulations, representing failure mechanisms from cleavage fracture to corrosion effects in fatigue, and a range of materials from classic pressure vessel steels, to fiber reinforced plastics, to additively manufactured metallic materials. A CD containing all the Extended Abstracts has been published by ASTM International and distributed at the Symposium.

The symposium began with the twentieth presentation of the Swedlow Memorial Lecture by Professor Leslie Banks-Sills from the School of Mechanical Engineering at Tel Aviv University, Ramat Aviv, Israel. Her lecture, "Statistical Analysis of Interface Fracture and Delamination failure of Composites," was particularly well received and began the symposium on a solid foundation. Dr. Banks-Sills, President of the European Structural Integrity Society (ESIS) also served as the liaison from ESIS as co-sponsor of the symposium.

Over the two and a half days of the symposium, an international mix of new faces and long-recognized, steadfast experts provided new insights and advances to the ever-maturing field of fatigue and fracture knowledge. This special issue of *Materials Performance and Characterization* (MPC) collects eleven of these presentations recast as full-length journal articles. The variety of scope in the articles is significant, and as such they are simply organized alphabetical by title. The issue leads off with three papers representing the continuous efforts of the ASTM Committee E08 on Fatigue and Fracture, sponsor of the symposium, to improve the quality and effectiveness of mechanical testing for fracture and fatigue evaluation through developments in testing methodology and test data assessment. An additional four papers provide experimental data and assessment of testing techniques and materials for topics ranging from crack size and shape effects on near-threshold fatigue crack growth rates, to alternative test methods for cleavage fracture characterization, and the effects of defects and surface conditions on fatigue crack nucleation. Collecting a final category of papers for analysis and simulation, two papers provide results for the simulations of fracture behavior as influenced by manufacturing and hydrogen effects and two papers provide substantiation of significant analytical development of tools related to optimizing crack growth rate material models for variable-amplitude loading, and the results of an analytical round robin for assessment of surface cracks, leading to an improved published version of an ASTM standard.

The 17th International ASTM/ESIS Symposium on Fatigue and Fracture Mechanics was a success and the symposium chairs offer sincerely appreciation to ASTM symposium staff, particularly Kelly Dennison and Hannah Sparks in ASTM Symposia Operations. The symposium chairs have also served as guest

editors for this special issue of MPC and must thank the MPC staff for their gracious patience in guiding us through this process, in particular Alyssa Conaway, Publication Specialist at ASTM, Sara Welliver and Cat Wyatt in the MPC Editorial Office, and Dr. Rick Neu, Co-Editor, MPC.

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Authors preparing papers for submittal should observe the conventions of style explained in the ASTM Style Manual. Since the journal does not request page charges, the author is expected to conform to these standard conventions for style. SI units are to be used throughout; if data were not measured in SI units, a note should appear to that effect and the original units should be included in parentheses after the SI units.

IN APPRECIATION

The high quality of the papers that appear in this publication is a tribute not only to the obvious efforts of the authors represented but to the unheralded, though essential, efforts of their reviewers. It is to the reviewers dedication to upholding the high standards of their profession that this note pays tribute. On behalf of ASTM International and the authors as well, we acknowledge with appreciation their important contribution to the success of this journal.

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