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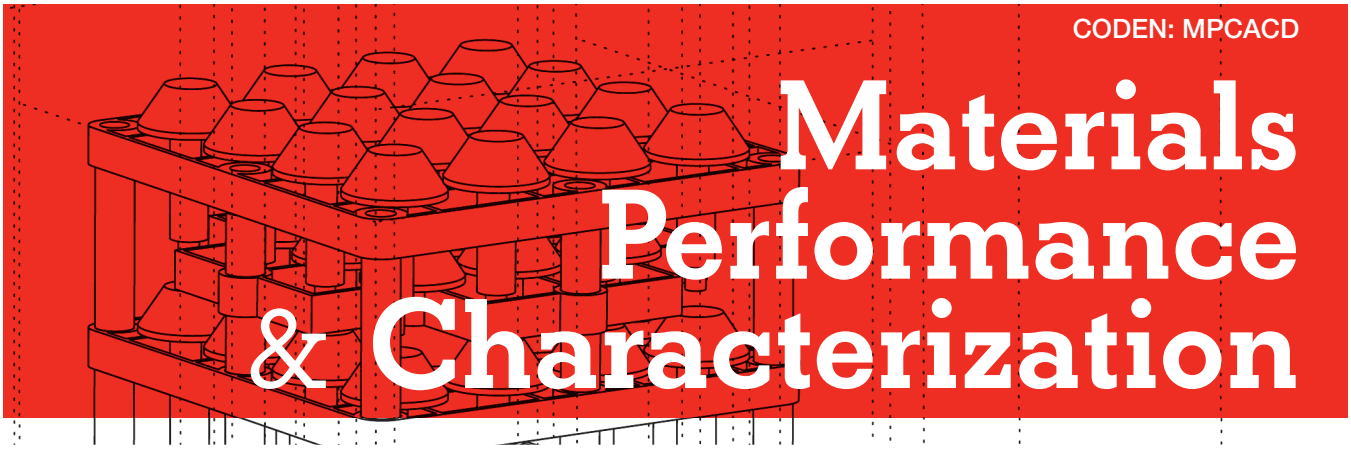

Materials Performance & Characterization

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Special Issue on Metallography, Part 2

Guest Editor: George F. Vander Voort

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Materials Performance and Characterization is published online by ASTM International, a nonprofit technical organization that develops and publishes voluntary consensus standards and related information for materials, products, systems, and services.

Contributions are peer reviewed prior to publication.

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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

Special Issue on Metallography, Part 2

It has been a great honor, and a real pleasure, to be asked by the co-editors of ASTM International's journal *Materials Performance and Characterization*, Dr. Richard W. Neu and Dr. George E. Totten, to act as guest editor for a two-part special issue of this prestigious journal. With their help, we were able to attract a large number of excellent papers written by leading engineers and scientists from all over the world. These authors specialize in the microstructural characterization of metals and alloys of many compositions, made by a wide variety of processes, followed by a variety of casting or hot working processes; some of the alloys were further processed by a variety of heat treatment processes, surface hardening techniques, and welding procedures. Hence, the papers cover many interesting technologies for our readers.

The second part of this special issue presents the final eighteen of forty-two papers that were submitted and subjected to the peer review process performed by experts in the fields that were covered by each submitted paper. We thank both the authors and the reviewers for their hard work and dedication. I also thank the ASTM staff dealing with the entire multitude of issues related to the process of publishing an outstanding journal.

This special issue starts with two articles of historical nature. Professor Michael Notis, a friend of mine for about 45 years (as I was a graduate student at Lehigh), presents an interesting review of the history of Metallography at Lehigh University. Many of you know about the superb, very intensive (classes often run to late in the evening!) summer program that has taught many metallographers and metallurgists since the early 1970s how to get the most out of their SEM. Omid Oudbashi and colleagues at the Art University of Isfahan and the Islamic Azad University in Iran present a study of a recently discovered metallic coffin found in Western Iran. The large bathtub-like coffin contained a skeleton with two gold strips covering the eyes and mouth. The coffin was a Cu-Sn alloy with minor amounts of Zn, Pb and As.

Alexander Kazakov, a close friend of mine from the Peter the Great Saint Petersburg Polytechnic University and an advisory member to ASTM Committee E04 on Metallography, presents his study to improve the assessment of banding segregation in steels by creating a new banding ratio which is being added to ASTM E1268. This new ratio is a more sensitive index than what we developed originally.

Part 2 contains a number of interesting articles describing microscopy studies of a wide variety of problems and materials. Hugo Lopez from the University of Wisconsin–Milwaukee discusses the identification of intermediate precipitates in as-cast engine blocks made from A319. Alexander Kazakov and his colleagues submitted three more interesting articles. In one paper, they developed an image analysis procedure to measure the amount of allotriomorphic ferrite which was correlated with toughness tests. Another paper developed improved understanding of high-nitrogen, high-manganese steels with non-magnetic behavior using thermodynamic calculations, color etching and light microscopy in polarized light. In their fourth article on characterization, they used EBSD to study inhomogeneity during controlled rolling and the origin of coarse bainite in line pipe steels.

Kevin Abbasi and colleagues at Case Western Reserve University studied scale formation in alumina-forming alloys using time-of-flight secondary ion mass spectrometry (triple beam). Niklas Gammeltoft-Hansen and colleagues from the Technical University of Denmark developed special preparation methods to study titanium alloys with a large amount of interstitial elements by light microscopy.

S. V. S. Narayana Murty and colleagues at the Vikram Sarabhai Space Center in India study how heterogeneous structures in cast alloys performed more poorly than more homogeneous wrought alloys, although the wrought alloys exhibited anisotropy. They also observed failures from non-metallic inclusions in cold drawn wire. Olufunmilayo Joseph and colleagues in Nigeria and India studied the role of Cl in increasing pitting corrosion of micro-alloyed steel in simulated fuel grade ethanol. Julie Strickland of the University of North Texas and colleagues studied the anisotropy of steel pipes that were radially strained and radially strained and aged using miniature tensile bars. Narayanan and colleagues from India measured the anisotropy in residual stresses in aluminum alloys utilized in the aerospace industry.

Additive manufacturing is a hot topic these days. William Wood and colleagues at Portland State University studied heat-affected zone formation by electrospark deposition on AM ultra-high strength steel. L. A. Espinosa at the Universidad Autonoma de Neuvo León (Mexico) studied the effect of homogenization and microstructural refinement of high temperature compression of Al-Si-Mg alloys and found that the cracking rate increased as the solidification rate decreased with cracking located by the intermediate precipitates.

Part 2 ends with three papers about studies of duplex stainless steels. Cem Örnek and colleagues at the University of Manchester (UK) studied 475 °C embrittlement of 2205 using a wide range of analytical tools. M. Breda and colleagues at the University of Padova (Italy) examined strain-induced martensite detection methods using four grades of duplex stainless steel, 2101, 2304, 2205 and 2507. The leaner grades were more susceptible when cold worked. S. Raveendra and colleagues examined machined chips of SAF 2507 that are known to exhibit segmentation. Primary and secondary shear zones were observed with adiabatic shear bands in the primary shear bands which were studied by transmission Kikuchi diffraction/transmission EBSD.

We hope that you enjoy these papers, as well as those from Part 1 of the special issue.

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Information for Authors

For details regarding paper submission go to http://mc04.manuscriptcentral.com.

The subject matter must not be of a speculative nature and the contents must not include materials of an advertising nature. The paper must not be seriously defective as to literary form and structure, continuity of thought, and clarity of expression. The substance of the paper should not have been published previously in the open literature.

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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