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TMS 2017
146th Annual Meeting & Exhibition

February 26 – March 2, 2017
San Diego, California, USA

HUME-ROTHERY AWARD SYMPOSIUM: ALLOY PHASE CHEMISTRY AT THE ATOMIC LEVEL—OPPORTUNITIES AND CHALLENGES

A new generation of experimental and modeling techniques now permits exploration of local phase chemistry at the atomic level. The implications of this work are wide-ranging, both for improving the understanding of existing materials, and for the development of new and improved materials for structural and functional use. Applications include improvements in the understanding of strengthening mechanisms in engineering materials; characterization of the role of alloy elements and trace additions on phase transformation behavior; assessment of safe operating lifetimes of materials under thermal aging and irradiation conditions; and the design and development of new materials for maximum performance in terms of mechanical, electrical, optical, or magnetic properties. Success in these areas is critically dependent on the accuracy and reliability of the experimental techniques being used, and on the quantitative validation of the theoretical models employed. Considerable issues arise at this point. Experimental methods are being pushed to their limits, and benchmarking standards are difficult or impossible to obtain. Theoretical models require simplifying assumptions, which may distort outcomes or reduce the level of confidence in the numerical results obtained.

The focus of this symposium is to assess the state of art in atomic-scale characterization and modeling of alloy phase chemistry and to identify the key steps needed in order to make further progress. What works? What does not work? How can we do better? In the absence of reliable quantitative standards for individual techniques, cross-correlation is required between different experimental methods, between different modeling approaches, and especially between experimental and modeling studies of the same system(s). Papers are invited which contribute to the above themes. Critical appraisals of the strengths and weaknesses of individual techniques (atom probe tomography, X-ray microanalysis, electron energy loss spectroscopy, etc.) for specific applications are sought. Case studies involving the use of a range of experimental techniques to study a single materials problem are particularly welcome. Special prominence will be given to studies which involve both advanced experimental work and state-of-the-art modeling approaches.

ORGANIZERS

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PROCEEDINGS PLANS

Selected papers from this symposium may be published in the TMS journal, *Metallurgical and Materials Transactions*.

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