

# SUBMIT AN ABSTRACT FOR THE FOLLOWING SYMPOSIUM

### MATERIALS SYNTHESIS AND PROCESSING

## Ultrafine-Grained and Heterostructured Materials (UFGH) XIV

Ultrafine-grained and heterostructured (UFGH) materials have drawn great attention from the materials research community due to their exceptional mechanical and functional properties. Heterostructures with architectured microstructure, such as coarse-grained colonies embedded in a fine-grained matrix, multi-length scale twins arranged in a tailored configuration, and the incorporation of transformational phases within non-transformational phases, etc., can achieve outstanding combinations of mechanical performance unattainable in homogeneous materials. The design and formation of heterostructures enable a new perspective to enhance further the properties of UFG materials produced by severe plastic deformation and other processing techniques. Importantly, heterostructured materials can be manufactured using industrial-scale facilities, enabling cost-effective and large-scale production.

The continued advancement of UFGH materials relies heavily on sophisticated characterization techniques that illuminate their complex microstructural heterogeneity and their influence on mechanical behavior. Advanced methods such as high-resolution transmission electron microscopy, in situ mechanical testing, atom probe tomography, synchrotron X-ray diffraction, etc. are pivotal for understanding the microstructural evolution, deformation mechanisms, and grain boundary phenomena inherent to these materials. Such techniques bridge the gap between processing, microstructure, and performance, providing critical insights for tailoring properties and optimizing designs. This symposium highlights all aspects of the science and technology of UFGH materials, spanning fundamental experimental and modeling research into industrial applications. Emphasis is placed on advanced characterization techniques that accelerate the discovery, development, and deployment of UFGH materials, guiding innovations in performance and reliability.

Specific topics include, but are not limited to:

- Fundamental issues in the processing of UFGH materials including, but not limited to, medium to severe plastic deformation techniques
- Novel UFG and heterostructures
- Mechanical and physical properties, and functional properties of UFGH materials
- Deformation mechanisms of UFGH materials
- Performance and structural changes of UFGH materials under extreme environments (irradiation, thermo-mechanical, corrosion, creep, fatigue, etc.)
- Emerging processing methods for UFGH materials, such as powder processing and rapid-solidification, mechanical and/or thermal processing
- Multi-scale modeling of deformation and fracture of UFGH materials

- Novel in situ and ex situ techniques to characterize the behaviors, properties, and microstructure of UFGH materials
- Applications

### **SPONSORED BY:**

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