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TMS 2023

152nd Annual Meeting & Exhibition

MARCH 19–23, 2023
SAN DIEGO CONVENTION CENTER &
HILTON SAN DIEGO BAYFRONT
SAN DIEGO, CALIFORNIA, USA
#TMSANNUALMEETING

SUBMIT AN ABSTRACT BY JULY 1 FOR THE FOLLOWING TMS2023 SYMPOSIUM:

NANOSTRUCTURED MATERIALS

Nanostructured Materials in Extreme Environments

Many critically important applications (such as nuclear, aerospace and defense) involve extreme environments where high temperature, high mechanical stress, high strain-rate deformation, corrosive atmosphere and intense irradiation are present. Such extreme environments pose significant challenges to the materials being used. Nanostructured materials, including ultrafine-grained and nanocrystalline materials, nanotwinned metals and alloys, nanolayered materials, nanoparticles or nanoprecipitates strengthened materials, etc., have exhibited many excellent properties like high mechanical strength and superior irradiation resistance and attracted a lot of research. Their improved properties make them promising candidates for applications in extreme environments. In addition, from the aspect of fundamental research, nanostructured materials in harsh environments offer exciting opportunities to investigate how microstructures respond to the environment and how this eventually affects the mechanical and physical properties. However, there are strong driving forces for irreversible processes such as coarsening or compound formation in nanostructured materials due to the existing high density of interfaces in them. Therefore, strategies need to be developed for the stabilization of the nanostructures.

This symposium will focus on understanding the unique aspects of the response of nanostructured metallic, ceramic, and composite materials in extreme environments. Abstracts are solicited in, but not necessarily limited to, the following areas with respect to nanostructured materials:

- Response in high temperature environment
- Irradiation response and defect generation and migration, as well as microstructure evolution during irradiation
- Evolution of mechanical and physical properties under extreme conditions
- Corrosion (and/or erosion) resistant nanomaterials and coatings
- Stress corrosion cracking of nanomaterials
- In-situ characterization of materials response in harsh environments
- Response in simultaneous and coupled multiple extreme environments
- Diffusive and displacive phase transformations in harsh environments
- Strategies for stabilizing nanostructure in extreme environments
- Theory and computational modeling of defect generation and interactions with interfaces under harsh environment
- Methodological development of modeling tools for materials response in extreme environments

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