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TMS2024

153rd Annual Meeting & Exhibition

MARCH 3–7, 2024
HYATT REGENCY ORLANDO
ORLANDO, FLORIDA, USA
#TMSAnnualMeeting

SUBMIT AN ABSTRACT FOR THE FOLLOWING TMS2024 SYMPOSIUM:

MECHANICS OF MATERIALS

Mechanical Behavior at the Nanoscale VII

The mechanical behavior of materials emerges from the aggregate operation of competing deformation mechanisms that initiate at the nanoscale. Small-scale mechanics investigations therefore provide critical insights into the fundamentals of deformation phenomena and form a basis for scaling theories. Additionally, the reduction of organizational scale often enables activation of new deformation mechanisms and mechanical behaviors that are not operational in bulk materials.

This symposium will focus on the deformation behavior of nanostructured materials. A wide variety of nanostructured materials are considered within this scope, including low-dimensional and 2D materials, multilayers, nanoarchitectured materials and nanolattices, and bulk nanocrystalline aggregates. Studies that examine size effects and scaling laws, new nanoscale deformation phenomena, emerging methods in nanomechanical characterization, and developments in modeling techniques are welcomed.

Topics will include:

- Size effects on elastic properties, strength, plasticity, fracture mechanisms, adhesion, tribology and fatigue behavior in small-volume and low-dimensional systems, including nanopillars, nanowires, nanoparticles, nanostructured fibers, 2D materials, thin films, multilayered materials, and nanolattices
- New nanoscale deformation and failure phenomena in emerging materials and materials systems including concentrated multi-component solutions (e.g., high entropy alloys), complex alloys, sustainable/lean alloys, 2D materials, nanotwinned materials, and nanoarchitectured systems
- Emerging studies in nanomechanics-coupled phenomena including the tailoring of functional properties with size-dependent topologies
- Transitions in deformation mechanisms due to scaling effects such as activation of interface-mediated mechanisms, exhaustion of deformation sources, and size effects on strain-induced phase transformations
- Developments in ex situ and in situ (SEM, TEM, synchrotron, neutron, etc.) techniques that push the limits of nanomechanical characterization (e.g., for extreme conditions such as high temperatures and/or high strain rates)
- Studies of nanoscale deformation processes using modeling, simulation, and/or AI/big data approaches and coupling of these techniques to meso/microscale methods

ORGANIZERS

Matthew Daly, University of Illinois-Chicago, USA
Douglas Stauffer, Bruker Nano Surfaces & Metrology, USA
Wei Gao, Texas A&M University, USA
Changhong Cao, McGill University, Canada
Daniel Kiener, University of Leoben, Austria
Sezer Ozerinc, Middle East Technical University, Turkey
Niaz Abdolrahim, University of Rochester, USA
Yu Zou, University of Toronto, Canada

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Contact programming@tms.org