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TMS2025

154th Annual Meeting & Exhibition

March 23–27, 2025
MGM Grand Las Vegas
Hotel & Casino
Las Vegas, Nevada, USA
#TMSAnnualMeeting

SUBMIT AN ABSTRACT FOR THE FOLLOWING TMS2025 SYMPOSIUM:

ADVANCED CHARACTERIZATION METHODS

Heterostructured and Gradient Materials (HGM VI): Principle, Processing and Properties

This is the sixth international symposium that focuses on the principle, Processing and properties of Heterostructured and Gradient Materials (HGMs). These include, but are not limited to, heterostructured lamella materials, gradient materials, layered materials, dual-phase materials, harmonic (core-shell) materials, heterostructured composites, etc. HGMs are characterized by large differences (100%) in mechanical and physical properties among heterostructured zones. The large mechanical incompatibility leads to strong inter-zone interactive coupling. This produces back stresses in the soft zones and forward stresses in the hard ones, which collectively produce hetero-deformation induced (HDI) strengthening. This distribution enhances the yield strength and produces extra strain hardening above conventional dislocation hardening, promoting ductile behavior. This unique deformation behavior is found to produce a superior combination of high strength and high ductility that is not achievable with either nanostructured or coarse-grained homogeneous materials. HGMs have become a major field of scientific exploration for the materials, mechanics and physics communities in the coming years. The HGM strategy is not only capable of producing structural materials with unprecedented mechanical properties, but is also effective for developing multifunctional materials. Innovative top-down or bottom-up approaches and material architectures, some of which may be bio-inspired, need to be explored and developed to produce HGMs with superior or disruptive properties. Many fundamental issues still need to be studied by experimentation, analytical modelling, and numerical simulations. Particularly, interface engineering and key interface-related phenomena, such as dispersive strain bands, interactions between geometrically necessary dislocations and zone boundaries, as well as the emergence and evolution of internal stresses, need to be addressed. This symposium, and the future biannual symposia to follow, will be a forum for bringing together a diverse group of multidisciplinary researchers to exchange ideas, discuss key issues, and promote industrial technology development for commercial production and applications.

ORGANIZERS

Yuntian Zhu, City University of Hong Kong; **Kei Ameyama,** Ritsumeikan University; **Irene Beyerlein,** University of California, Santa Barbara; **Yuri Estrin,** Monash University; **Huajian Gao,** Tsinghua University; **Ke Lu,** Liaoning Academy of Materials; **Hyoung Seop Kim,** Pohang University of Science and Technology; **Xiaolei Wu,** Institute of Mechanics

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