THE MATERIALS SCIENCE AND ENGINEERING DEPARTMENT
FALL COLLOQUIUM SERIES PRESENTS:

Kevin Hemker

Chair and Professor of Department of Mechanical Engineering

Johns Hopkins University

Understanding and mitigating amorphization to improve the ballistic performance of boron carbide

Boron carbide has proven to be an excellent material for use as personal body armor due to its light weight and ultrahigh hardness, but its ballistic performance is severely degraded by comminution during high impact events. This loss of ballistic performance has been associated with local amorphization, and subsequent quantum mechanical predictions have suggested that compositional control and selective alloying might be used to mitigate amorphization. This seminar will review the progress realized in a highly collaborative effort to simulate, produce, and characterize three successive generations of stoichiometric (B4C), B-rich, and B/Si co-doped boron carbide. We will focus on the unique mechanical response of boron carbide and our efforts to reduce amorphization and improve its ballistic response.

Kevin Hemker is the Alonzo G. Decker Chair and Professor of Mechanical Engineering at Johns Hopkins University and holds appointments in the Departments of Materials Science & Engineering and Earth & Planetary Sciences. He served as Chair of the Department of Mechanical Engineering, President of TMS and editor of Scripta Materialia, and has been also a member of the DARPA Defense Science Research Council, the HRL Technical Advisory Group and the SRI Technology Council. His group strives to elucidate the underlying atomic-level details that govern the mechanical response and performance of a variety of materials, including nanocrystalline materials, materials for MEMS, metallic micro-lattices, thermal protection systems, armor ceramics, additive manufacturing, and high temperature structural materials in general. He is a Fellow of AAAS, ASME, ASM and TMS.

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In person only; no Zoom

Questions? Contact allison.macknick@northwestern.edu and megan.ray@northwestern.edu

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