



College of Engineering

Department of
Mechanical & Industrial Engineering

The Sidney E. Fuchs Seminar Series

3:00-4:00pm, Friday, November 2, 2018

1200 Patrick F Taylor Hall



Understanding and Multiscale Modeling of Deformation Twinning in Hexagonal Metals

by **Jian Wang***

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Hexagonal materials such as Mg, Zr, and Ti with a hexagonal close-packed (hcp) structure are used in automotive, nuclear, aeronautic, and defense technologies. The basic plasticity mechanisms associated with hcp structures are slip and twinning. Due to the scarcity of “easy slip” systems that accommodate the strain along the $\langle c \rangle$ -axes in hexagonal materials, deformation twinning plays a crucial role in determining mechanical properties and texture evolution. Twinning exhibits more complex nucleation, propagation and interaction mechanisms in hexagonal structure than in cubic structures. This brings a challenge in predicting texture evolution and mechanical behaviors of polycrystalline aggregates. In this talk, I will focus on the fundamental understanding of nucleation, propagation, and interactions of deformation twins and their effects on mechanical behavior according to atomistic modeling and in situ microscopic observations, and the development of predictive models at micro-, meso- and macro-scales.

* Dr. Jian Wang is a full professor of Mechanical and Materials Engineering at the University of Nebraska-Lincoln. He received his PhD in Mechanical Engineering from Rensselaer Polytechnic Institute, Troy, NY, USA, in 2006; then he worked at Los Alamos National Laboratory as Technical Staff Member for 9 years. He moved to the UNL since Aug. 2015. His research interests are focusing on quantitative exploring the structure-properties relationships of structural and nanostructured materials using multi-scale theory, modeling and experimental methods and techniques. He was awarded the LANL Distinguished Postdoctoral Performance Award (2009), the LDRD/Early Career Award (2011), TMS MPMD Young Leader Award (2013), International Plasticity Young Research Award (2015), and Materials Today Rising Stars in the category of Materials Genome (2018). He has published more than 230 peer-reviewed journal articles (> 8000 Citations and H-index of 55). He has delivered 150+ invited/keynote lectures. He is serving as Editorial Board for several material and mechanics Journals.