



## **ME Department Seminar**

### ***Rapid Acquisition of 3D Data at the Mesoscale for Property Modeling in Structural and Functional Materials***



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**2:00 p.m.**

**2505 GG Brown(subject to change)**

**Abstract:**

The development of high fidelity material property and life prediction models often requires three-dimensional information on the distribution of phases, interfaces, grains or extrinsic defects. Acquisition of this information in appropriate representative volume elements ultimately limits the use of conventional tomography techniques. The use of femtosecond lasers for layer-by-layer ablation provides new tomography capabilities in terms of the volume of material that can be sampled in relatively short time periods. The high pulse frequency (1 kHz) of ultra-short (150 fs) laser pulses can induce material ablation with virtually no thermal damage to the surrounding area. An in-situ platform for laser-based tomography that combines the femtosecond laser within a focused ion beam platform has been developed. This TriBeam platform allows for high resolution imaging, as well as crystallographic and elemental analysis on a spectrum of metallic, polymer and ceramic systems. New 3D mesoscale characterization information critical for optimization of the properties of NiTiSn-based thermoelectrics, Cu-W composites and Ni-based turbine disk alloys will be presented.

**Bio:**

Tresa Pollock is the Alcoa Professor of Materials and Department Chair at the University of California, Santa Barbara. She graduated with a B.S. from Purdue University in 1984, and a Ph.D. from MIT in 1989. Dr. Pollock was employed at General Electric Aircraft Engines from 1989 to 1991, where she conducted research and development on high temperature alloys for aircraft turbine engines. She was a professor in the Department of Materials Science and Engineering at Carnegie Mellon University from 1991 to 1999 and the University of Michigan from 2000 - 2010. Her current research focuses on the processing and properties of structural materials and coatings and on the use of ultrafast lasers for microfabrication and materials diagnostics. Professor Pollock was elected to the U.S. National Academy of Engineering in 2005 and the Germany Academy of Sciences Leopoldina in 2015. She is a Fellow of TMS and ASM International, Editor in Chief of the Metallurgical and Materials Transactions family of journals and was the 2005-2006 President of The Minerals, Metals and Materials Society.