



## 2013 DORN MEMORIAL LECTURE

**Tresa M. Pollock**

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University of California, Santa Barbara

**“A New Tri-Beam Tomography System: How Much Information  
is Enough?”**

The development of high fidelity material property models often requires three-dimensional information on the distribution of phases, grains or defects. A grand challenge, however, is efficient acquisition and reconstruction of 3-D materials information. A new tomography approach for nm-scale characterization of materials over mm<sup>3</sup>-scale volumes will be presented. The use of femtosecond lasers allows for *in-situ* layer-by-layer material ablation with high material removal rates. 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. This technique has been demonstrated *ex-situ* with optical imaging and more recently *in-situ* with a “TriBeam” approach that combines the femtosecond laser within a focused ion beam platform to permit high resolution imaging, as well as crystallographic and elemental analysis. Examples of 3D datasets acquired from Ni-base alloys, W-Cu *magnitude faster* than focused ion beam systems. The problem of representative volume elements and the amount of data needed for property models will be addressed.

**Biography:** 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, is a Fellow of TMS and ASM International, Associate Editor of Metallurgical and Materials Transactions and was the 2005-2006 President of The Minerals, Metals and Materials Society.

**Tuesday, February 12, 2013**

**Tech L211, 4:00pm**

*Reception to follow*

*Cook Hall - Atrium, 5:15pm*