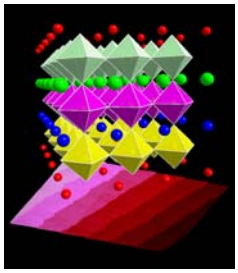
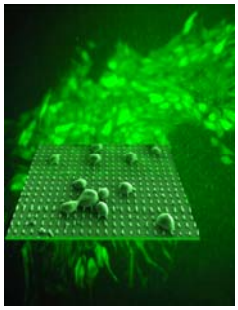
CNMS DISCOVERY SEMINAR SERIES

Friday, March 26, 2010
11:00 am
Iran Thomas Auditorium, 8600





Thermomechanical Probes at the Nanometer Scale

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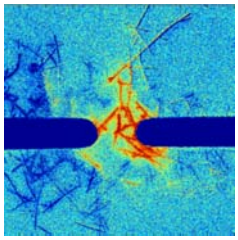

Abstract:

The ability to control temperature fields at the nanometer scale enables new capabilities for nanomechanical characterization and nano-manufacturing. This talk provides a broad overview on research into thermal and thermomechanical processing at the nanometer scale. The first part of the talk describes atomic force microscope cantilevers with integrated thermal elements capable of measuring temperature-dependent physical, electrical, and chemical properties on the 10 nm scale. Such measurements enable quantitative material identification well below the diffraction limit of conventional spectroscopy. The second part of the talk describes nanomanufacturing with these probe tips. Such tips can form three-dimensional features in polymer, metal, and glass with 10 nm resolution and include both mechanical forming and thermally-activated chemical reactions. The properties of these nanostructures will be described, as will the scale-up of these manufacturing techniques to conventional scales.

Host: Sergei Kalinin, sergei2@ornl.gov, 865.241.0236

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William P. King is Associate Professor and Willett Faculty Scholar in the Departments of Mechanical Science and Engineering and Materials Science and Engineering at the University of Illinois Urbana-Champaign. He received the Ph.D. (2002) degrees in mechanical engineering from Stanford University. He worked at the IBM Zurich Research Laboratory and was formerly on the Faculty at Georgia Tech. Dr. King is the winner of the CAREER award from the National Science Foundation (2003), the PECASE award from the Department of Energy (2005), and the Young Investigator Award from the Office of Naval Research (2007). He was named Young Manufacturing Engineer by the Society of Manufacturing Engineers (2006). In 2006, Technology Review Magazine named him to the TR35-one of the people under the age of 35 whose innovations are likely to change the world. In 2007 his innovations were selected for an R&D 100 Award and a Micro/Nano 25 Award and in 2008 he won his second R&D 100 Award. In 2009 he won the ASME Bergles-Rohsenow Award for Young Investigator in Heat Transfer. He is co-founder of two companies and is a Member of the Defense Sciences Research Council.