PRISM Seminar Series – Fall 2012

PRISM
NNSA Center for Prediction of Reliability, Integrity and Survivability of Microsystems

PURDUE UNIVERSITY Discovery Park

"Dynamic In-Situ Transmission Electron Microscopy to Meet the Challenges of the Nanoworld"

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Friday, Nov. 9th, 2012
12:00 pm, BRK 2001

Abstract: Recent developments in instrumentation have made it a very exciting time to perform both fundamental and applied research in the electron microscope. Aberration correctors have taken spatial resolution below the 1 angstrom barrier for inorganic materials and promise to do the same for organic/biological materials. In-situ microscopy is moving forward at a rapid pace with the development of gas/liquid stages that permit reaction processes to be imaged and analyzed at atomic resolution. The development of nanosecond and faster photoemission electron sources offers the chance to move the high spatial resolution world of electron microscopy into the ultrafast world of materials dynamics. Conventional in situ TEM coupled with ultrafast TEM can be utilized to gain a fundamental understanding of dynamic processes occurring in materials and biological structures. The combination of these capabilities allow for vast improvements of in-situ TEM studies limited by video rate in that many processes span multiple time and length scales. Ultrafast dynamic in-situ electron microscopy promises to answer challenging questions in the fields ranging from materials science to biology. In this presentation, examples of high resolution scanning transmission electron microscopy studies will be presented for nanostructures and catalysts. Additionally, development of the ultrafast electron microscopy and its application to materials science and nanotechnology will be discussed.

Speaker Bio:

Dr. Volkan Ortalan, formerly, a postdoctoral scholar at Physical Biology Center for Ultrafast Science and Technology at California Institute of Technology, began his undergraduate studies at the Middle East Technical University in Turkey and received two BS degrees in Metallurgical and Materials Engineering and in Mechanical Engineering. He received his PhD from University of California-Davis in 2010, where he received the Microbeam Analysis Society Distinguished Scholar Award (2009) and Microscopy Society of America Poster Awards (1st Place Physical Science in 2008 and 2009). He was a visiting scientist at the National Center of Electron Microscopy at Lawrence Berkeley National Laboratory in 2007-8 and at the Advanced Microscopy Laboratory at the Oak Ridge National Laboratory in 2008-9. His research interests include the development of ultrafast dynamic transmission electron microcopy for atomic-scale visualization in space and time and applications of in situ (ultrafast dynamical) TEM to phase and structural transformations, materials under extreme conditions, nucleation and growth of nanomaterials, molecular-level dynamic imaging of biological structures and high resolution environmental TEM for heterogeneous catalysis.

Refreshments will be served. *For further information please contact Matthew Potrawski, mpotraws@purdue.edu*
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