

2010-2011 Graduate Seminar Series

The Department of Mechanical Engineering – Engineering Mechanics

Proudly Presents

Professor Xiao-Dong Zhou

University of South Carolina



Dr. Zhou received his B.S. and MS from Chemical Engineering, East China Univ. Sci. & Tech. and a Ph.D. in Ceramic Engineering from Missouri Univ. Sci. & Tech in 2001.

Currently, Dr. Zhou is an Associate Professor in Chemical Engineering Department at the University of South Carolina. Previously, he was a Senior Research Scientist at Pacific Northwest National Laboratory, a US-DOE Lab in Washington, and an Assistant Research Professor at Missouri University of Science and Technology (MS&T). As an Associate faculty member at MS&T, he led research programs and supervised graduate students.

At PNNL, Dr. Zhou was leading research on energy materials, including cathode for solid oxide fuel cells, thermoelectric oxides and photoelectrochemical cells. He has been principal investigator or co-principal investigator of 9 programs on materials development related to energy science and technology, and thermoelectrics. Since 2001, his early career has been highlighted by 50 peer-reviewed articles that span the areas of structural, transport and magnetic properties of condensed matters; nonstoichiometric chemistry; advanced processing and device physics. In addition, he has published 8 invited book chapters, 3 invited journal articles, and 16 proceedings papers; contributed to over 100 presentations; and received 6 US patents/disclosures.

Research Interests are fundamental multiscale physics and electrochemistry of materials and interfaces for energy systems, including fuel cells, thermoelectrics, building materials, capacitors, and batteries, and gas separation membranes for carbon capture.

Thursday, Sept. 16, 2010 4:00 – 5:00 p.m. Room 112, ME-EM Bldg.

Basic science research in solid oxide fuel cells

I will describe material physics and electrochemistry of the cathode for solid oxide fuel cells (SOFC), focusing on the relationship between the electrochemical performance of a macroscale SOFC system and physical properties of its micro/atomic scale components. The emphasis will be on research at atomic scale, with a particular emphasis on experimental and theoretical approaches to investigate a conjugated phenomenon for the cathode: the dichotomy between performance and performance stability. I will illustrate these approaches by using the concept of disorder in materials (e.g. lattice defects) to study charge exchange and transport in the components and across the interfaces in an SOFC. Moreover, the role of defects on enhanced transport properties of oxide conductors at nanoscale will be discussed, which offers opportunities for technological innovations. In addition, I will discuss cross-validation of fuel-cell measurements from *dc* I-V sweep and *ac* electrochemical impedance spectroscopy.

Funding for the ME-EM Graduate Seminar Series is provided by Professional Plating, Inc. of Anoka, MN www.proplate.com
and the Department of Mechanical Engineering – Engineering Mechanics www.me.mtu.edu/seminar