

MSE SEMINAR

Prof. Yongho Sohn
Professor
Department of Materials Engineering
University of Central Florida

“Past, Present and Future of Experimental Diffusion Investigations”

Abstract

Starting with Sir Robert-Austen’s observations (published in Phil. Trans. Roy. Soc. in 1896) on Gold-Lead interdiffusion, understanding of solid-state diffusion through experiments has played many critical roles in materials and surface engineering for a variety of applications. Today, diffusion studies are carried out for development of Mg- and Al-based alloys and composites for lightweight energy-efficient structure, Ni-alloys for gas turbine components and magneto-caloric refrigeration, and U-alloys for low-enriched nuclear fuels. Experimental diffusion investigations are also needed in the immediate-future for the development of high throughput thermo-kinetic measurements (e.g., Materials Genome), high entropy alloys, and composition-specific parts by additive manufacturing. Careful control of initial and boundary conditions imposed on experimental diffusion investigation make the results ideal to compare to modeling/simulation at various dimensional and time scales for accuracy and consistency. Furthermore, given the ability of diffusion to explore composition-temperature axes, this simple experimental concept is now expanding to assess functional materials properties beyond phase equilibrium and thermo-kinetic parameters. Properties that can be readily determined include elastic/plastic mechanical properties via nano-indentation. With the advances in focused ion beam and micro-scale measurement techniques, experimental diffusion investigation presents an endless possibility and value for research and development of materials.

Bio

Dr. Yongho Sohn is a Professor of Materials Science and Engineering, and Associate Director for Materials Characterization Facility at University of Central Florida. He received his B.S. with honors and M.S. from Worcester Polytechnic Institute in mechanical and materials engineering, respectively. He graduated in 1999 with Ph.D. in materials engineering from Purdue University, and spent two years as a post-doctoral research scholar at the University of Connecticut. He joined University of Central Florida in 2001 as an assistant professor, was promoted to associate professor with tenure in 2005, and promoted to professor in 2010. His research and teaching focus on microstructure analysis/control and diffusion kinetics for materials and coatings for gas turbine engines, advanced nuclear fuels with low enrichment, and superlight-weight metal matrix composites. He is a recipient of NSF CAREER Award (2003-08), UCF’s 2012 and 2006 research incentive awards, and UCF’s 2007 and 2013 teaching incentive award. He is an associate editor for Journal of Phase Equilibria and Diffusion.

Date: Monday, February 23, 2015

Time: 10:30-11:30 am

Location: ARMS B071