



College of Engineering  
Department of  
Mechanical & Industrial Engineering

## The Sidney E. Fuchs Seminar Series

3:30-4:20pm, Friday, October 10<sup>th</sup>, 2014  
Frank H. Walk Design Presentation Room



### Radiation Effects in Materials and Nuclear Fuels

by **Jian Gan**\*

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Nuclear Fuels and Materials Division**

This presentation will start with a general introduction of the Global energy distribution and projection to 2050, followed by the role of Nuclear Power in the energy development. The topic will then focus on the nuclear power reactor systems and the associated issues with materials and fuels. This includes the current nuclear power systems and the proposed next generation advanced nuclear reactors. A brief introduction on the fundamentals of radiation effects in materials will be provided. The main focus of this talk is on the microstructural development of reactor structural materials and the nuclear fuels and their impact on the performance. The microstructural data presented here are mainly generated from the transmission electron microscopy (TEM) work. A detailed microstructural characterization of the irradiated U-Mo fuel will be given as an example to demonstrate the importance of combining different types of advanced characterization techniques to improve the understanding of the fuel performance in the nuclear reactor.

\* Dr. Gan is currently a distinguished staff scientist since 2011 in the Fuel Performance and Design Department at Idaho National Laboratory (INL). He has been working as principal investigator and work package manager on multiple DOE project since 2002. He received his Ph.D. in Nuclear Engineering from the University of Michigan (1999), his M.S. degree in Physics from Central Michigan University (1992), and his B.S. degree in Physics from Fudan University in Shanghai, China (1982). He was a senior staff scientist and a staff scientist at INL during 2007-2011 and 2005-2007, respectively. His work includes TEM characterization of irradiated nuclear fuels and development of diffusion barrier ceramic coating for fuel cladding. Before joining INL, he worked at Argonne National Laboratory-West as a staff scientist in 2002-2005 and Pacific Northwest National Laboratory as a post-doc in 1999-2001. His work during that period of time includes materials R&D for generation-IV reactors covering ceramic materials and oxide dispersion strengthened (ODS) advanced alloys for high temperature and high radiation dose application. He has been actively working in the research on irradiation effects in materials and nuclear fuels for more than 20 years, with a focus on investigating microstructural development under irradiation using transmission electron microscopy and the correlation between microstructure and fuel or materials performance. He currently has 74 publications. He has been pioneering the transmission electron microscopy work in recent years for irradiated nuclear fuels for research and test reactors as a part of Global Threat Reduction Initiative (GTRI) program managed by the DOE.