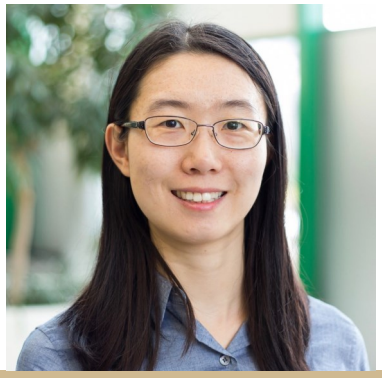
PURDUE UNIVERSITY | School of Nuclear Engineering

Nuclear Engineering Seminar

Dr. Xuan Zhang,

Principal Materials Scientist, Argonne National Laboratory



Wednesday, March 29, 2023

3:30pm | WALC 1018

Synchrotron High-energy X-ray Studies of Nuclear Structural Materials

Abstract

Synchrotron x-ray diffraction- and imaging-based techniques are ideal tools for probing the evolution of deformation microstructures at multiple length scales and for revealing the underlying deformation mechanisms in bulk irradiated materials in situ and/or in 3D. Such tools are also advantageous in the study of additively manufactured materials. This talk will feature a few recent studies conducted at the Advanced Photon Source in Argonne National Laboratory. Examples include an in-situ diffraction study of a change in tensile deformation behavior in neutron-irradiated type 316 stainless steels, an in-situ 3D study of grain-level response to tensile deformation in neutron-irradiated Fe-9Cr ferritic alloy, and a study of porosity evolution under creep deformation in additively manufactured 316L stainless steel. The current status of the Activated Materials Laboratory, a new radiological facility to facilitate the study of nuclear materials at the APS that is built in conjunction with the APS-Upgrade project supported by the Nuclear Science User Facilities, will also be presented.

Dr. Xuan Zhang is a Principal Materials Scientist in the Nuclear Science and Engineering Division at Argonne National Laboratory (ANL). She obtained her Ph.D. from the Materials Science and Engineering Department in University of Illinois at Urbana-Champaign in 2014 with a thesis work on nanoscale self-organization in ion-irradiated ternary alloys. She then joined the Nuclear Materials group in ANL as a postdoctoral researcher and was later converted to a staff member. Her research at ANL focuses on the development, testing, characterization and qualification of advanced structural alloys for reactor applications. Her technical expertise includes mechanical testing, synchrotron X-ray techniques and electron microscopy. She is particularly interested in understanding the microstructure-mechanical property correlation in irradiated materials. Over the years, she has focused on bringing the cutting-edge in-situ and 3D X-ray diffraction and microscopy techniques to the nuclear materials community. Her current interests also include the study of laser additive manufacturing (AM) processes as well as the characterization and testing of AM alloys. She currently supports the US DOE-Office of Nuclear Energy's Advanced Reactor Technologies (ART) program, the Advanced Materials and Manufacturing Technologies (AMMT) program, and the Light Water Reactor Sustainability (LWRS) program.