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2:30PM - 4:00PM
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Nondestructive examination of nuclear materials

Dr. William Chuirazzi is the Instrument Scientist for Idaho National Laboratory's (INL) ZEISS Xradia 620 Versa X-ray microscope housed at the Irradiated Materials Characterization Laboratory (IMCL) as well as the group leader for the X-ray Sciences Group. He received his PhD from The Ohio State University in Nuclear Engineering in 2020 where his dissertation focused on boron-based neutron scintillator screens for use in neutron imaging. His research interests include applying nondestructive evaluation, multi-modal imaging, and image analysis for energy advancement. As an Instrument Scientist for IMCL's X-ray microscope, Dr. Chuirazzi nondestructively examines highly radioactive nuclear materials to inform the traditional post-irradiation examination (PIE) process. His work consists of imaging and analyzing Advanced Gas Reactor (AGR) TRISO particles and compacts, battery materials, and structural materials, amongst others. Dr. Chuirazzi is always happy to engage with potential collaborators and X-ray microscope users.

Nuclear power is an attractive option to satisfy increasing energy demands worldwide since is a carbon-free, energy-dense power source that offers high energy density. New nuclear concepts must be extensively tested, developed, and studied before they can be licensed and approved for commercial power applications. Novel nuclear materials and concepts must undergo pre- and post-irradiation examination (PIE) to assess their performance in the nuclear reactor environments. Idaho National Laboratory's Irradiated Materials Characterization Laboratory (IMCL) exists to handle highly irradiated nuclear materials with the purpose of performing PIE on these materials. The goal of these PIE studies is to characterize material properties and performance under reactor conditions. In addition to more traditional analysis techniques such as Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM), micro X-ray computed tomography (XCT) has recently been utilized to augment existing characterization capabilities. XCT is a nondestructive evaluation technique that can provide volumetric information, which is particularly useful for targeted, informed destructive analysis as well as providing input for nuclear fuel code modeling. In this talk, Dr. William Chuirazzi will give an overview of micro XCT and it's application to highly radioactive samples. This lecture will highlight practical application on examining highly radioactive specimens as well as quantitative 3D data extraction.

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