PURDUE UNIVERSITY | School of Nuclear Engineering

Nuclear Engineering Seminar

Dr. Brian Ade,

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3:30pm | WALC 1018

Enabling High Temperature Reactor Deployment in Population Centers using Ultra Safe Nuclear's FCM Fuel

Abstract

Ultra Safe Nuclear Corporation (USNC, https://www.usnc.com/) is developing a range of nuclear systems for different applications, including a high temperature gas-cooled micro reactor, a transportable reactor system, and a nuclear thermal propulsion system. The flagship product, the Micro Modular Reactor (MMR), can provide electricity and/or process heat with a thermal output ranging between 15 and 45 MWth depending on operator needs. The MMR uses USNC's proprietary fully ceramic microencapsulated (FCM) fuel form that combines TRISO fuel and additive manufacturing to yield geometrically complex fuel shapes with nearly 60% packing fraction. An overview of USNC's fuel and reactor technology will be provided, as well as how these technologies are being used to deliver a research reactor capability at the University of Illinois Ubana-Champaign to perform at-scale demonstrations in hydrogen production, desalination, microgrid distribution, and more.

Brian Ade is the Fuel Design Director at Ultra Safe Nuclear Corporation (USNC), where he leverages leads a team of engineers to deliver nuclear fuel and its qualification across USNC's suite of reactor products, including the Micro Modular Reactor (MMR), a nuclear thermal propulsion concept, and a small-scale transportable reactor system suitable for electricity production for earth and space missions. These concepts leverage coated particle (TRISO) fuel integrated into fuel elements using an additive manufacturing (3D printing) process. Before joining USNC, Brian was a senior R&D staff researcher within the Nuclear Energy and Fuel Cycle Division of Oak Ridge National Laboratory specializing in reactor physics analyses, reactor design, and nuclear nonproliferation R&D. While at ORNL, he led the design thrust for the Transformational Challenge Reactor (TCR) program, which utilized additive manufacturing for critical core components with the goal to provide a revolutionary platform to dramatically reduce the deployment costs and timelines of nuclear energy systems. Brian received B.S. and M.S. degrees in Nuclear Engineering from Purdue University.