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TMS 2025
154th Annual Meeting & Exhibition



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MGM Grand Las Vegas
Hotel & Casino
Las Vegas, Nevada, USA
#TMSAnnualMeeting



SUBMIT AN ABSTRACT FOR THE FOLLOWING TMS2025 SYMPOSIUM:

NUCLEAR MATERIALS

Microstructural, Mechanical, and Chemical Behavior of Solid Nuclear Fuel and Fuel-Cladding Interface II

Fuel and fuel-cladding interaction constitute the key to understanding fuel performance. The combined effects of microstructural evolution and chemical change cause loss of performance in various forms such as embrittlement, deformation, phase instability, etc., which need to be well understood to enable materials evaluation and prediction in normal and accident scenarios. The designs of current and next-generation reactors are varied. Types of fuels include ceramic, metal, and composite fuels, such as UO₂, UN-, U₃Si₂-, U-Zr-, U-Mo-based, and TRISO. There are also multiple types of cladding materials in use or under consideration, e.g., Zircaloy, stainless steels, SiC/SiC composites, ODS, HEA concepts, and cladding coatings. In particular, the confounding factors from chemically active fission products (lanthanides, tellurium, etc.) and impurities (oxygen, carbon, etc.) can complicate the fuel performance analysis, due to changes in fuel and fuel-cladding interactions. Meanwhile, the rapid progress of advanced reactor technologies in the industry underscores the urgent need to expedite the development and qualification of nuclear fuels. This symposium aims to bring together experimental and computational investigations that assist in understanding the microstructural, mechanical, and chemical changes in solid fuels and fuel-cladding interfaces. Both the synergistic and separate effects of involved physical processes, with fresh or certain burn-up or surrogate fuels, are of interest. This symposium also calls for research on fuel performance modeling using multi-scale and multi-physics methods. Studies of advanced fuel types and cladding concepts are strongly encouraged.

The topics of interest include experimental and modeling efforts in the following aspects, but not limited to:

- Evolution of defects, microstructure, and phase in fuels or fuel surrogates
- Impact of impurities on microstructure and phase transformation of fuels or fuel surrogates
- Behaviors of fission products in fuels and/or cladding
- Development of claddings for advanced reactors
- Fuel-cladding mechanical and chemical interactions
- Accelerating fuel development and qualification via advanced characterization, multi-scale simulation, machine learning, and other techniques

ORGANIZERS

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QUESTIONS?

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