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TMS 2023

152nd Annual Meeting & Exhibition

MARCH 19–23, 2023
SAN DIEGO CONVENTION CENTER &
HILTON SAN DIEGO BAYFRONT
SAN DIEGO, CALIFORNIA, USA
#TMSANNUALMEETING

SUBMIT AN ABSTRACT BY JULY 1 FOR THE FOLLOWING TMS2023 SYMPOSIUM:

NUCLEAR MATERIALS

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

Fuel and fuel-cladding interaction constitute the key to understanding fuel performance. The combined effect 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. The types of fuels include ceramic, metal, and composite fuels, including UO2-, UN-, U3Si2-, U-Zr-, U-Mo-based, and TRISO. There are also multiple types of cladding materials in use/consideration, e.g., zircoloy, stainless steels, SiC/SiC composite, oxide dispersion strenghtened, and high entropy alloy concepts and coating, made by various advanced manufacturing methods. 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 the changes in fuel and fuel-cladding interaction.

This symposium aims to bring together experimental and computational investigations that assist in understanding the microstructural, mechanical, and chemical changes in these 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. Analysis of advanced fuel types and cladding concepts are strongly encouraged. This symposium also calls for multi-scale modeling and simulations and fuel-performance modeling.

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

- 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
- Fuel-cladding mechanical and chemical interactions
- Advanced manufacturing and characterization technologies for nuclear fuels

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