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March 10–14, 2019
 San Antonio, Texas, USA

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NUCLEAR MATERIALS

Ceramic Materials for Nuclear Energy Research and Applications

Ceramic materials play a critical role in nuclear energy research and applications. Nuclear fuels, such as uranium dioxide (UO₂) and mixed oxide (MOX) fuels, have been widely used in current light water reactors (LWRs) to produce about 15% of the electricity in the world. Silicon carbide (SiC) is a promising accident-tolerant cladding material and is under active research studies. Some oxide ceramics have been proposed for novel inert matrix fuels or have been extensively studied as waste forms for the immobilization of nuclear waste. Moreover, ceramics are under active studies for fusion reactor research.

This symposium focuses on experimental and computational studies of ceramics for nuclear energy research and applications. Both practical reactor materials and surrogate materials are of interest. Topics of interest include: defect production and evolution; mobility, dissolution, and precipitation of solid, volatile, and gaseous fission products; changes in various properties (e.g., thermal conductivity, volume swelling, mechanical properties) induced by microstructural evolution; and radiation-induced phase changes. Experimental studies using various advanced characterization techniques for characterizing radiation effects in ceramics are of particular interest. The irradiation techniques such as laboratory ion beam accelerators, research and test reactors, as well as commercial nuclear power reactors are all of interest. Computational studies across different scales from atomistic to the continuum are all welcome. Contributions focused on novel fuels such as doped UO₂, high-density uranium fuels like uranium nitrides and silicides, and coatings for accident-tolerant fuel claddings are also encouraged. This symposium is intended to bring together national laboratory, university, and nuclear industry researchers from around the world to discuss the current understanding of the radiation response of ceramics through experiment, theory, and multi-scale modeling.

Some focused topic areas will be:

- Experimental characterization of non-irradiated and irradiated oxide ceramics
- Multi-scale modeling on microstructure evolution and physical properties in ceramics
- Thermal-mechanical properties of oxides for nuclear energy
- Non-oxide ceramics for nuclear energy

ORGANIZERS

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Nearly 4,000 presentations are planned
 at more than 80 symposia at TMS2019.

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