SUBMIT AN ABSTRACT FOR THE FOLLOWING TMS2025 SYMPOSIUM:

NUCLEAR MATERIALS

Mechanical Behavior of Nuclear Reactor Materials and Components IV

Current and future generation nuclear reactors require improved structural materials that improve efficiency during in-service conditions, allow for long reactor lifetimes, and increase safety during accidents. To meet these needs, an increasingly large number of reactor designs are being considered (e.g. fusion, molten salt, LWRs, etc.) with distinct material concepts to address each design's unique environmental conditions. The effects of reactor environments on mechanical behavior will be a key component to predicting strength and performance of materials in the aforementioned circumstances. In turn, these advanced understandings will aid in technology transfer and commercialization efforts of the various reactor designs.

This symposium aims to take a closer look at the mechanical behavior of reactor components across length scales and reactor environments. With recent advancements and increased use of in-situ techniques, more is known about irradiation effects on strength than ever before. Simultaneously, ex-situ techniques are critical to probe component-sized parts and validate the use of a material for inclusion within a reactor. As in-situ techniques become more advanced, synergistic effects of temperature, irradiation, and corrosion can be probed simultaneously. Furthermore, cooperation with materials modeling is advancing the prediction of material performance under normal and accident conditions, as well as reactor lifetimes.

Topics of interest include, but are not limited to:

- Mechanical behavior testing, including tension, compression, bend, bulge, creep, fatigue, and fracture
- Standalone and synergistic effects of environment on mechanical properties, including dose, dose rate, temperature, and corrosion
- Development of microstructure sensitive material strength models
- Modeling and simulation of irradiation defect interactions during mechanical testing
- Macroscopic component modeling for full scale performance
- In-situ mechanical testing, including micro- and nanomechanical compression and tension
- Small-scale specimen validation for nuclear component evaluation and qualification
- Novel techniques to probe material strength under reactor conditions
- Challenges involved with successful market deployment and technology transfer

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