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TMS 2026

155th Annual Meeting & Exhibition

March 15–19, 2026
San Diego Convention Center
and Hilton San Diego Bayfront
San Diego, California, USA
#TMSAnnualMeeting

SUBMIT AN ABSTRACT FOR THE FOLLOWING SYMPOSIUM

NUCLEAR MATERIALS

Accelerated Qualification Methods for Nuclear Reactor Structural Materials

The development of new nuclear reactor structural materials will lead to the improved longevity of the current fleet of reactors and spur the launch of next generation reactors as well. However, due to safeguards and regulations, the implementation of advanced reactor materials requires the extensive and costly qualification and licensing of these materials which takes decades. An accelerated nuclear reactor materials qualification campaign aimed at shortening the nuclear reactor materials qualification timeline down to five to ten years is currently under way. The accelerated qualification of these materials requires an in depth understanding of the thermomechanical behavior under reactor conditions through accelerated irradiation experiments, various in situ and ex situ characterization techniques, separate effects investigation, and performance testing. This extensive data collection effort is used as the basis for computational models, machine learning, and artificial intelligence algorithms which can down select and optimize material components and predict material performance after many years of operation thus resulting in significantly more efficient deployment of new nuclear reactor materials.

This symposium focuses on studies, both computational and experimental, aimed at the accelerated qualification of nuclear reactor structural materials.

Abstracts are encouraged for the following topic areas (but not limited to):

- Combinatorial approaches to more efficiently down-select and optimize materials
- Accelerated neutron, proton, and heavy ion irradiation experiments
- In situ and ex situ experiments and characterization which simulate and evaluate materials exposed to reactor core conditions
- Computational studies including modeling, machine learning, and artificial intelligence aimed at predicting performance after extended reactor core exposure
- Accelerated time dependent mechanical testing, such as creep, fatigue properties, stress corrosion, either by testing or model prediction of long-term performance

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TMS Structural Materials Division; TMS Nuclear Materials Committee; TMS Additive Manufacturing Committee; TMS Computational Materials Science and Engineering Committee; TMS Integrated Computational Materials Engineering Committee; TMS Materials Characterization Committee; TMS Mechanical Behavior of Materials Committee

ORGANIZED BY:

- **Patrick Warren,** University of Texas at San Antonio
- **Tianyi Chen,** Oregon State University
- **Rongjie Song,** Idaho National Laboratory
- **Caleb Clement,** Westinghouse Electric Company
- **Mira Khair,** University of Texas San Antonio
- **Jennifer Stansby,** UNSW Sydney / UTSA
- **Sriswaroop Dasari,** University of Texas at El Paso

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QUESTIONS?
Contact programming@tms.org