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TMS2024

153rd Annual Meeting & Exhibition

MARCH 3–7, 2024
HYATT REGENCY ORLANDO
ORLANDO, FLORIDA, USA
#TMSAnnualMeeting

SUBMIT AN ABSTRACT FOR THE FOLLOWING TMS2024 SYMPOSIUM:

NUCLEAR MATERIALS

Accelerated Qualification of Nuclear Materials Integrating Experiments, Modeling, and Theories

Rapid development, evaluation, qualification, and licensing of nuclear materials are critical to deploying advanced nuclear power systems to timely meet zero-emission goals. The response of reactor fuel, core, and structural materials to irradiation, among other environments, is vital to the system's performance. These four steps can be accelerated from the traditional way by focusing on understanding the governing mechanisms of the thermomechanical properties, which often rely on the microstructure and microchemistry. Advanced lower-length modeling methods allow to systematize the prediction of promising materials while advanced manufacturing techniques broaden the envelope of microstructure engineering and enable rapid prototyping.

Continuous development of accelerated testing technologies is accompanied by advances in material modeling, in-situ and ex-situ characterization techniques for microstructure and properties. The resultant abundant and high-quality experimental and lower-length modeling data are designed to provide input to develop and verify engineering-scale modeling and simulation tools, essential to modern material system design, integral performance analyses, and support materials qualification and licensing. Key to demonstrating the suitability of such experimental techniques to understanding material performance in an applied setting is the integration with mechanistic models and quantification of uncertainty.

This symposium will focus on recent results from nuclear-material development and qualification programs worldwide and cover fundamental and applied science aspects of accelerated nuclear materials testing for fission and fusion reactors. Presentations integrating experiments with theory, modeling, and simulation to develop the methodologies for accelerated qualification and enhance our understanding of environment-induced degradation in materials are especially encouraged.

Abstracts are solicited for (but not limited to) the following irradiation program topics:

- Accelerated and in-situ material testing
- Development and application of modeling in supporting qualification and licensing
- Microstructure and property changes in response to service conditions
- Performance prediction based on processing-microstructure-property correlations
- Fundamental science of radiation damage and defect processes

ORGANIZERS

Tianyi Chen, Oregon State University, USA
Assel Aitkaliyeva, University of Florida, USA
Antoine Claisse, Westinghouse Electric, Sweden
Caleb Clement, Westinghouse Electric, USA
Michael Cooper, Los Alamos National Laboratory, USA
Eric Focht, U.S. Nuclear Regulatory Commission, USA
David Frazer, Idaho National Laboratory, USA
Lingfeng He, North Carolina State University, USA
Walter Williams, Idaho National Laboratory, USA

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TMS Structural Materials Division
TMS Nuclear Materials Committee

QUESTIONS?
Contact programming@tms.org