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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

Special Topics in Nuclear Materials: Reproducibility and Uncertainty; Hydrogen Effects; Space and Microreactor Systems

Nuclear materials research is continuously evolving within an environment of rapidly shifting socio-political, economic, and environmental policies and priorities, as well as in response to research advances across the broader materials science community. This symposium captures emergent topics to facilitate deep and timely discussions that will elevate the impact and visibility of these topics, and build research momentum in these areas. For TMS 2026, three emerging topics are identified:

Reproducibility and Uncertainty in Nuclear Materials Research:
The state-of-the-art for nuclear materials research is constantly progressing with improvements in experiment design, instrumentation, computational power, and analysis methods. As a result, there is a new ability to repeat or reproduce historical experiments and gain new understanding. Additionally modern methodologies likely reduce uncertainties in measurements from common alloys and materials. Presentations are sought that address the reproducibility and uncertainty of nuclear materials research studies with emphasis on new insights that can be gained from reproducing or reanalyzing historical studies. Both experimental and computational studies are encouraged.

Examples include:
- New insight gained from repeating historical experiments with modern methods and/or analyses
- Uncertainty in properties and radiation performance within an alloy specification (heat-to-heat variations)
- Uncertainty in experimental history (cycle length, reactor power, cycle ramp) and its propagation to scientific understanding
- Introduction of uncertainty through different length scales of examination (indentation size effect, SEM vs TEM particle quantification, etc)

Hydrogen Effects:
Small but mighty, hydrogen isotopes play a significant role in the performance of nuclear materials: from hydride embrittlement in zirconium alloys, to degradation of metal-hydride moderators in microreactors, to deuterium and tritium implantation in fusion plasma-facing materials. This mini-symposium seeks presentations on areas from experimental characterization to atomistic modeling of hydrogen-influenced phenomena in metallic and ceramic nuclear materials.

Abstracts are invited, but are not limited to, those that investigate the following topics:
- Post-irradiation characterization of accelerator targets
- Hydride formation and mechanical properties impact in zirconium/structural alloys
- Fabrication, irradiation, and degradation of metal-hydrides
- Tritium interactions in liquid-facing and solid breeder materials
- Hydrogen isotope retention and release in fusion materials

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Materials Challenges for Space and Microreactor Systems:
The space and defense sectors are increasingly turning to nuclear energy to power long-term space exploration, remote combat zones, and our increasingly militarized outer space. The nuclear thermal propulsion (NTP) and micro-reactor systems under consideration exhibit unique materials challenges. Their more compact designs require materials to operate at unprecedented thermal and irradiation fluxes, interface with coolants and/or propellants that are not well-understood, and withstand significant uptake of gases and transmutants including hydrogen.

This mini-symposium invites abstracts investigating but not limited to:

- Novel materials and fuels for NTP or defense micro-reactors
- Irradiation-corrosion unique to space or micro-reactor environments
- Degradation phenomena in NTP or defense micro-reactor materials

SPONSORED BY:
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ORGANIZED BY:
Stephen Taller, Oak Ridge National Laboratory
Charles Hirst, University of Wisconsin-Madison
Janelle Wharry, University of Illinois
Caleb Clement, Westinghouse Electric Company
Mary O'Brien, Los Alamos National Laboratory
Elizabeth Kautz, North Carolina State University

QUESTIONS?
Contact programming@tms.org