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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

DATA-DRIVEN AND COMPUTATIONAL MATERIALS DESIGN

Thermodynamics and Kinetics of Alloys IV

Understanding and optimizing the thermodynamic and kinetic behavior of alloys are fundamental to advancing the design and performance of structural and functional metallic materials. The "Thermodynamics and Kinetics of Alloys IV" symposium serves as a unique forum for interdisciplinary discussions bridging experimental and computational approaches, emphasizing real-world applications, the integration of advanced characterization techniques, and future directions in alloy thermodynamics and kinetics.

This symposium highlights the synergy between experimental and computational methodologies, focusing on recent advancements in thermodynamic stability, phase transformations, diffusion kinetics, synthesis, and characterization. A distinctive focus is placed on experimental validation, processing-structure-property relationships, and data-driven alloy development.

Key topics include but are not limited to:
- Experimental-Computational Integration: Combining experimental insights with computational multi-scale modeling (CALPHAD, DFT, molecular dynamics, and machine learning, etc.) to predict phase stability, diffusion, and microstructural evolution. This session fosters collaboration between experimentalists and modelers to drive innovation in alloy research.
- Theoretical and Computational Advances: Leveraging theoretical insights and computational tools to develop advanced models linking alloy composition, microstructure, and properties. Topics include emerging methodologies that enhance the mechanical, magnetic, electronic, and photonic properties of multicomponent alloys.
- Advanced Characterization and Alloy Performance: Employing cutting-edge synthetic techniques, high-throughput autonomous experimentation, and advanced characterization techniques to accelerate the understanding of thermodynamic stability and kinetic behaviors in alloys.
- Rapid and Automated Alloy Design: Showcasing novel data-driven strategies for accelerated alloy discovery and optimization, including high-throughput screening, autonomous experimentation, and AI/ML integration with traditional computational and experimental methods. This session explores automation in alloy design, enabling the rapid identification of optimal compositions, microstructures, and processing pathways for targeted applications.

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QUESTIONS?
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