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TMS2025

154th Annual Meeting & Exhibition

March 23–27, 2025
MGM Grand Las Vegas
Hotel & Casino
Las Vegas, Nevada, USA
#TMSAnnualMeeting

SUBMIT AN ABSTRACT FOR THE FOLLOWING TMS2025 SYMPOSIUM:

ADDITIVE MANUFACTURING

Additive Manufacturing and Alloy Design: Bridging Fundamental Physical Metallurgy, Advanced Characterization Techniques, and Integrated Computational Materials Engineering for Advanced Materials

Obviating some of the traditional manufacturing and alloy design barriers, additive manufacturing (AM) makes possible complicated micro-/nano-structures and geometries, which cannot be obtained via conventional manufacturing. Advanced materials, which can outperform their conventional counterparts, are actively being designed with substantially distinctive microstructural features. This symposium invites submissions that focus on exploiting the unique characteristics of AM to design and develop advanced structural or functional materials, employing a "First-Principles" or "Materials by Design" approach. This symposium will feature a comprehensive exploration of the fundamental physical metallurgy and alloy design principles for AM, leveraging the power of advanced characterization techniques, computer simulations, and analytical theory to unlock insights into materials behavior. A significant emphasis of the symposium is placed on alloy design principles, strengthened by the integration of state-of-the-art characterization techniques, such as atom-probe tomography (APT), scanning/transmission electron microscopy (S/TEM), electron backscatter diffraction (EBSD), X-ray diffraction (XRD), and 4D scanning transmission electron microscopy (4D-STEM) in combination or correlatively. These cutting-edge techniques combined with analytical theory, and mathematical and physical simulations provide researchers with the tools to study AM materials at a hierarchy of relevant length scales, allowing for a holistic and nuanced understanding of their far-from-equilibrium structures, as well as their physical and mechanical properties. Discussions surrounding the synergies between Integrated Computational Materials Engineering (ICME), physical simulations and real-world experiments, which highlight the potential of this combined approach in advancing AM materials research are encouraged. By bringing together experts in physical and mechanical metallurgy, advanced characterization techniques, ICME, and thermodynamics, the symposium aims to propel the field toward innovative breakthroughs in materials design for AM.

Abstracts of fundamental or applied research are invited in the following subject areas:

- Introduction of novel structural or functional alloys designed specifically for additive manufacturing, including but not limited to: light metals (Al, Ti, Mg), steels, ferrous alloys, high-temperature alloys (Ni-, Fe-Ni- or Co-based superalloys), refractory alloys (Re, W), and high-entropy alloys.
- Micro-/nano-structure evolutions and phase transformations, including new stable or metastable phases formed under AM solidification conditions, which can be utilized to enhance the mechanical or physical properties of materials.
- Mechanical behavior- Physical behavior

ORGANIZERS

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QUESTIONS?
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