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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

ADVANCED CHARACTERIZATION METHODS

Novel Strategies for Rapid Acquisition and Processing of Large Datasets From Advanced Characterization Techniques

Quantification and correlation of microstructural data to material properties and process variables are key to the design of novel materials and optimization of advanced manufacturing processes. The investigation of the evolution of microstructural features (size, morphology, and chemistry) across different length and time scales in novel material systems and materials subject to advanced manufacturing processes demand the need for a thorough multiscale characterization approach, and typically results in large datasets. Recent developments in high-throughput and autonomous experimental approaches combined with advances in instrumentation, computational capabilities and analysis software have compounded the challenge of curating these large datasets. There is an imminent need for development of novel approaches/strategies to extract high quality and actionable microstructural information from these datasets in a rapid and efficient manner. This symposium seeks to bring researchers from industry and academia alike interested in discussing these novel strategies on data obtained from a single or a combination of techniques, which include - optical microscopy (OM), scanning electron microscopy (SEM), scanning/transmission electron microscopy (S/TEM), neutron and synchrotron x-ray-based techniques, atom probe tomography (APT), and x-ray micro-computed tomography (XCT).

Topics include, but are not limited to:

- High-throughput property or microstructural characterization methodologies that enable rapid discovery and/or improved design of novel material systems.
- Machine learning and AI guided real-time or post facto reduction of high-volume datasets acquired during in situ characterization studies of microstructure evolution.
- Challenges and opportunities related to curation, handling, access and storage of metadata/data from large characterization datasets and the adherence to FAIR data principles.
- Acceleration of feature extraction and quantification from large imaging (OIM, SEM, EBSD, S/TEM, radiography, tomography) spectroscopy and/or diffraction-based datasets through computer vision and/or machine learning workflows/packages.
- Workflows for on-the-fly data extraction and feedback for advanced manufacturing routes using in situ monitoring techniques.

SPONSORED BY:
TMS Structural Materials Division; TMS Advanced Characterization, Testing, and Simulation Committee

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