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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:

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:
- Advances in methods for feature extraction and quantification from large imaging datasets (OM, SEM, S/TEM, radiography, tomography) and their accelerated analysis through computer vision and/or machine learning packages.
- Novel developments in hardware enabling rapid acquisition of microstructural data for high-throughput characterization techniques and analysis workflows for autonomous characterization experiments.
- Utilization of machine learning enabled pipelines for fast reduction and quantification of microstructural information from large imaging, spectroscopy and/or diffraction-based datasets.

- Techniques for tracking and analysis of microstructural evolution in real time or post-facto from in situ characterization datasets ·
- Workflows for on-the-fly data extraction and feedback for advanced manufacturing routes using in situ monitoring techniques - e.g.- IR thermography, back-scatter electron imaging in additive manufacturing machines.
- Challenges and opportunities related to curation, handling, access, and storage of metadata/data from large characterization datasets and the adherence to FAIR data principles.

ORGANIZERS
Sriram Vijayan, Michigan Technological University, USA
Rakesh Kamath, Argonne National Laboratory, USA
Austin McDannald, National Institute of Standards and Technology, USA
Fan Zhang, National Institute of Standards and Technology, USA
Sarshad Rommel, University of Connecticut, USA

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TMS Structural Materials Division
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QUESTIONS?
Contact programming@tms.org