ASTM ICAM 2023

ASTM INTERNATIONAL CONFERENCE ON ADVANCED MANUFACTURING

Research to Application through Standardization

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Microstructural Aspects of AM

Key performance metrics and characteristics properties of components fabricated by additive manufacturing (AM) are often different from their conventionally manufactured counterparts. This is due to the distinctive microstructural features (e.g., strong texture, columnar grains, etc.) and possible process-induced flaws (e.g., lack of fusion, pores, keyholes, cracks, surface features, etc.) found in AM materials. These characteristics arise because of processing conditions unique to AM, such as layer-wise fabrication and exceptionally high cooling and solidification rates. It is therefore important to explore the various microstructural characteristics of AM materials and their impact on properties via experiments, models, and simulations.

Topics of interest include but are not limited to:

- Process - structure - property relationships of microstructure and flaws in AM materials
- AM process modeling (e.g., microstructure, flaws, and residual stresses, etc.)
- Contribution of PSP relationships to Qualification and Certification in AM
- Influence of processing and post-processing on microstructure and flaws characteristics (e.g., thermal-mechanical treatment, surface modification, etc.)
- Microstructural and flaws evolution and their relationship to location-specific performance
- Compositional effects and strategies to optimize composition and mitigate flaws in AM processes
- Assessment of the role of phase transformations on microstructure, both solidification and solid state
- Advances in characterization strategies for AM microstructure and flaws
- Microstructure and flaw development in graded and multi-material processed by AM
- Microstructure and flaw predictions using artificial intelligence and machine learning
- Benchmark datasets for validation of computational methods
- AM material microstructure and flaws distribution as the base line for material properties datasets combinability
- Synergistic effects of flaws and microstructure on mechanical properties

Symposium Organizers

- Moataz Attallah, University of Birmingham – AMPLab, UK
- Robert Higham, University of Bolton, UK
- Soumya Nag, Oak Ridge National Laboratory (ORNL), USA
- Jonathan Pegues, Sandia National Laboratories, USA
- Anthony D. Rollett, Carnegie Mellon University, USA
- Swee Leong Sing, National University of Singapore, Singapore

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