



# ASTM INTERNATIONAL CONFERENCE ON ADVANCED MANUFACTURING

Research to Application through Standardization

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## Environmental Effects on AM Alloys and Parts

Additive manufacturing (AM) has greatly evolved over the past decade. However, research has primarily focused on the development of process parameters, microstructure characterization, and quantifying first order mechanical properties; there has only been limited study on environmentally induced degradation modes. To enable the use of AM for structural engineering components it is critical to understand how the differences in microstructure between AM and traditionally manufactured alloys will impact the various environment induced damage modes (e.g., corrosion, decomposition, stress corrosion cracking, corrosion-fatigue, etc.). Investigation of environmentally induced damage is critical to enable the use of AM processing routes for engineering components since it represents common real-world failure modes. Areas of interest in this topic area include. First, establishing the mechanistic underpinnings of AM specific damage modes and informing the “processing-structure-property” linkages to enable enhanced performance. Second, investigating how post-processing techniques such as heat treatment, surface treatment, or coating may influence the performance of AM alloys against environmental effects. Third, determining if legacy approaches and standards for characterizing environment induced degradation are sufficient and applicable to AM systems.

### Topics of interest include but are not limited to:

- Quantification and characterization of corrosion in AM alloys
- Environmental cracking of AM alloys (e.g., HE, SCC, corrosion-fatigue, etc.)
- H-metal interactions in AM alloys
- Identification of AM specific environmental degradation modes
- Linking microstructure features and residual stress state to corrosion and environmental cracking properties
- Characterization of passive film defect state and linkages to AM microstructural heterogeneities
- relative to wrought alloy counterparts
- Effects of processing parameters on environmental degradation (both build and post-processing)
- Methods to prolong the life of AM parts against environmental effects (e.g., coatings, etc.)
- AM specific standardization/characterization issues and challenges
- Modeling and simulation of the environmental effects on AM parts



### Symposium Organizers

- James Burns, University of Virginia, USA
- Ole Geisen, Siemens Energy, Germany
- Jiadong Gong, QuesTek, USA
- Michael Melia, Sandia National Laboratories, USA
- Jason Trelewicz, Stony Brook University, USA



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