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TMS 2025

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:

MATERIALS DEGRADATION AND DEGRADATION BY DESIGN

Environmental Degradation of Additively Manufactured Materials

Additive Manufacturing (AM) has grown and expanded rapidly, especially towards AM structural materials for aviation, space, marine, nuclear, and industrial applications. A lot of effort has been focused on the processing parameters and powder quality to improve the mechanical properties of additively manufactured materials for these demanding use cases, where the cost of AM is outweighed by the potential performance benefits. These materials often possess significant differences in microstructure from the rapid solidification processing or post-processing, as compared with more traditionally produced materials. Given these microstructural differences, evaluation of the environmental degradation of additively produced materials is essential for the prediction of microstructure stability, performance, and lifetime in harsh environments. Typically, AM components also involve higher surface areas, either from process surface roughness or deliberately designed into the complex geometry part, so surface treatments and coatings for AM for harsh environments are also of interest.

This symposium welcomes contributions that will foster discussion of how additively produced materials degrade in:

- corrosive environments
- high temperature, oxidizing environments
- harsh environments while under mechanical stress
- high radiation environments
- environmentally induced cracking (e.g., HE or SCC)
- materials compatibility with liquid metals and molten salts

Keywords: Environmental degradation, additive manufacturing, high-temperature corrosion, oxidation, high temperature structural alloys, internal oxidation, stresses, mass loss, oxide scale, water vapor, characterization, environment, hydrogen embrittlement, stress corrosion cracking

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