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**PROCEEDINGS**

# Evaluating the Degradation Behavior of Additive Manufacturing Zn Alloys for Biomedical Application

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**ABSTRACT**

Zn is a promising biomedical implant for its good biocompatibility, moderate mechanical strength, and suitable degradation rate. As a novel fabricating method, Additive Manufacturing (AM) could prepare biomedical Zn by raw powder deposition, melting, and molten pool solidification in a layer-by-layer pattern, which favors the customized shape and well-controlled geometry of the final product. Meanwhile, the rapid heating and solidification from AM often induces unique structural changes compared with traditional fabrication techniques, thus subsequently affecting the degradation behavior. Still, setting up the correlations among AM fabrication, structural changes and degradation behavior of Zn remains a challenging issue due to the complex nature of AM, thus rendering the application of AM Zn as biodegradable materials an open question. To remove these barriers, this work reviews the application of AM technology in biodegradable Zn alloys and analyzes the factors affecting the corrosion behavior. Summaries have been made not only from AM side, such as powder characteristics, laser energy density, building direction, and atmosphere, but also from sample side, such as geometric structure, porosity and pore size, grain size, surface roughness, residual stress, and chemical inhomogeneity. Furthermore, the corrosion behavior of AM pure Zn and Zn alloys (Zn-Cu, Zn-Mg, Zn-Li, Zn-Ag, Zn-Li-Mg, Zn-Mg-Cu, etc.) is summarized from aspects of corrosion products, corrosion mechanism, and corrosion rate. Through the comparison with the cast counterparts, AM technology seems to generally increase the corrosion rate of Zn and Zn alloys.

**KEYWORDS**

Biomedical Zn; additive manufacturing; degradation; corrosion

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