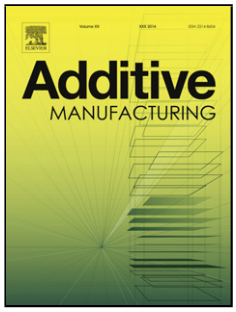

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Structure Property Relationship of Metal Matrix Syntactic Foams Manufactured by a Binder Jet Printing Process

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Abstract

The present research work has investigated the synthesis of ceramic structures based on inorganic, spherical-hollow microballoons using a binder jet printing process. Binder jet printing is a process that allows the synthesis process of complex and intricate parts with minimal waste of the feedstock material. The ceramic microballoons here investigated were based on a mullite derivative. The printed ceramic parts were cured and sintered as the precursor templates for metal matrix syntactic foams (MMSFs). The MMSFs were manufactured by infiltrating the printed ceramic templates by molten aluminum. The flexural strength of the cured, sintered, and infiltrated structures were also investigated. It is proposed that binder jet printing followed by a sintering and pressureless infiltration process represents an advantageous technology for designing complex MMSF structures.

Keywords: Metal matrix syntactic foams; Pressureless infiltration; Binder jet printing; Mechanical properties