Additive Manufacturing of High-Temperature Thermoset Composites Cured Using High-frequency Inductive Heating of Fillers

by

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ABSTRACT

High-temperature materials (HTM) are an invaluable part of multiple industrial processes such as plastic injection molding surfaces, airplane turbine blades, and a variety of other nonuniform molding surfaces. The composites used in these applications require work-intensive processes using reinforcement systems that inhibit freeform geometry and through-thickness variation in material properties. Additive Manufacturing offers the potential to break through the barriers of state-of-the-art (SOTA) materials by offering freedom of design and function. Additive manufacturing reduces production time by providing a model to product workflow with limited requirements for tooling and machine setup in advance. However, current work in printing thermoset composite parts is limited. This research proposes the creation of an additive manufacturing process for high-temperature thermoset composites based on UHTR, Milled Carbon Fiber, and Graphitized microballoons. The material system will introduce a novel curing process using **high-frequency inductive heating of fillers** to provide an even, effective cure without the need for post-processing.