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Solid free-form fabrication of metallic functionally graded materials: An Overview

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ABSTRACT

Functionally graded materials (FGMs) is innovative from the superior result of composite materials. It can be formed by varying chemical composition, physical properties, microstructures, or design attributes across the geometry of the material dimension. By these varying features, FGMs comes under heterogeneous materials. Heterogeneous materials to prevent cracks which arrives due to residual stress resulting from the differences in the properties of the different components in the material. The great advantage of FGMs is the required functionality can be obtained by tailoring the base material composition.

FGMs of high specific strength had numerous advantages like excellent heat and corrosion resistance, high fracture toughness, capability and being able to withstand ultrahigh temperature gradient and high strength. Moreover, the application of FGMs is highly appreciated in the biomedical industry due to specific microstructural features could be achieved by the controlled spatial distribution of the same. Among all fabrication routes of metal FGMs, the solid Free-Form Fabrication (FFF) is

one of the advanced potential manufacturing processes. Hence, the present paper was reported about the FFF of metal FGMs along with some other fabrication processes which are being practiced by several researchers. The challenges associated with the fabrication routs and future scope were also presented in detail.

Keywords: Functionally Graded Materials (FGMs); Solid Freeform Fabrication (FFF); Powder Synthesis.