

A review of powdered additive manufacturing techniques for Ti-6Al-4V biomedical applications

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ABSTRACT

Rapid advancements in science and technology have assured biomaterials and their associated fields towards becoming a multimillion-dollar industry. Biomaterials have been shown as one of the most promising materials for biomedical implant development. As such, this article intends to provide a comprehensive review of metal additive manufacturing (metal-AM) processes evolution used in biomedical applications. The most common types of metal-AM methods practised today are Selective Laser Sintering (SLS), Selective Laser Melting (SLM), Direct Metal Laser Sintering (DMLS), Electron Beam Melting (EBM) and Laser Engineered Net Shaping (LENS). The present review also covers the application of these metal-AM systems in Ti-6Al-4V-based implants fabrication. The scientific challenges and critical issues towards improving the biomaterial properties so that they are more notable in the biomedical industry are also discussed.

KEYWORDS: Additive manufacturing process; Metal-additive manufacturing; Ti-6Al-4V; Microstructure; Powder metallurgy

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