

## **Exploring the thumbprints of Ag-hydroxyapatite composite as a surface coating bone material for the implants**

### **ABSTRACT**

Poly(lactic acid) (PLA), although has many interesting physicochemical characteristics, the strong hydrophobicity and a lack of antibacterial activity restricting its widespread application in the medical sector. In a view of addressing some of the limitations of PLA, the current study aimed to test the antibacterial efficacy of active metal-doped bioceramic/PLA composite formed by the fused deposition manufacturing (FDM) technique. For the testing, we prepared polyvinyl alcohol (PVA) bound silver-hydroxyapatite (Ag-HAp) composite and further applied as a low-temperature coating onto the PLA scaffold designed for the appropriate cell development, differentiation, and bio-mineral establishment. From the analysis, we revealed that the larger surface area of three-dimensional (3D) printed composite material having the matrix porosity makes it a perfect biocompatible material with no loss to its mechanical potency. The HAp/PLA and Ag-HAp/PLA composites were tested for the hemocompatibility, and antibacterial activity (gram-positive and gram-negative bacteria). Further, the mechanical property of the Ag-HAp/PLA scaffold was tested. The results demonstrated that the Ag-HAp/PLA composite offers the biocompatibility and antibacterial ability and therefore can serve as the potential bone implant material.

**Keyword:** Poly(lactic acid) scaffolds; Silver doped hydroxyapatite; Fused deposition method; Antibacterial studies; Hemocompatibility; Hardness study