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Preparation and Characterization of Gelatin/ α -TCP/SF Biocomposite Scaffold for Bone Tissue Regeneration

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Abstract

In this study, we suggest a new biocomposite scaffold composed of gelatin/ α -TCP (tricalcium phosphate)/SF (silk-fibroin) (GTS) which has enhanced mechanical strength and high level of cellular activity. To fabricate GTS scaffold, a temperature-controlled 3D printing process was used and appropriate printing conditions were selected based on rheological data. To show the feasibility as a biomedical scaffold for bone tissue regeneration, the various physical and biological results, using MG63 (osteoblast-like cells), of the GTS scaffold were compared with those of a pure gelatin (G) and gelatin/ α -TCP (GT) composite scaffold. GTS scaffolds showed enhanced mechanical properties in dry and wet state compared to those of the G and GT scaffolds. Also, significantly high cell-proliferation and differentiation of MG63 cells were observed in the GTS scaffold. Therefore, the GTS composite scaffold will be one of highly potential biomaterials to be used in bone regeneration.

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