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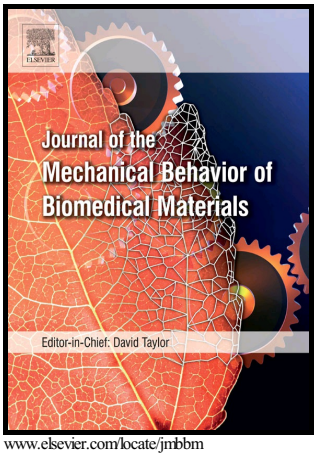

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Reinforcement of Freeze−Dried Chitosan Scaffolds with Multiphasic Calcium Phosphate Short Fibers

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Abstract

The composite scaffolds of the chitosan and multiphasic calcium phosphate (HW) short fibers were prepared by freeze drying and characterized by X-ray diffractometry (XRD), Fourier transform infrared spectroscopy (FTIR) and scanning electron microscopy (SEM and FE−SEM). The mechanical properties of the scaffolds were assessed by compression test. The incorporation of HW fibers consisting three phases of hydroxyapatite (HA), beta-tricalcium phosphate (β−TCP) and calcium pyrophosphate (CPP)into the chitosan matrices was associated with an increase in pore size, density and compressive strength and modulus, and a decrease in porosity and swelling ratio of the scaffolds. The strongest composite scaffolds in this study with a chitosan: HW fibers weight ratio of 1:1 showed a mean porosity of 69% and a mean strength and modulus of 420 kPa and 3.87 MPa, respectively. The in vitro bioactivity of the composites was confirmed by the formation of a calcium phosphate rich layer on the surface of soaked scaffoldsin simulated body fluid. The findings of this initial work indicate that the chitosan-multiphasic calcium phosphate short fibers may be a suitable material for bone scaffolding.

Keywords: Bone scaffold, Chitosan, Composite, Calcium phosphate short fibers, Mechanical reinforcment

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