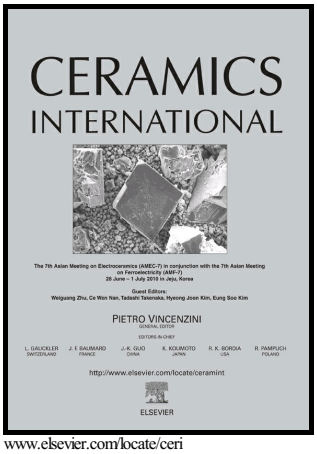

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Fabrication and performance of calcium phosphate cement/small intestinal submucosa composite bionic bone scaffolds with different microstructures

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Abstract

The microstructure of the tissue has a very important determining effect on its performance. Herein, two calcium phosphate cement (CPC)/small intestinal submucosa(SIS) composites bionic bone scaffolds with different microstructures were fabricated by rolling or/ and assembling method. The microstructure, 3D morphology, the crystal phase and mechanical properties of the scaffolds were investigated by micro CT, XRD, FIIR, SEM and electronic universal testing machines respectively. The results showed that the pore size of all scaffolds are in the range of 100~400 μm, which are beneficial to cells growth, migration, and tissue vascularization. Their porosity and the specific surface area were 14.53 ± 0.76%, 8.74 ± 1.38 m^2/m^3 and 32 ±0.58 %, 26.75 ± 2.69 m^2/m^3 separately. The high porosity and the large specific surface area can provide a larger space and contact area for cells adhesion and proliferation. Meanwhile, compressive strength of the scaffolds soaked were 10 MPa and 27 Mpa, about 1.2 folds and 3.2 folds of the original scaffolds, respectively. The results are derived from different microstructures of the scaffolds and chemical bonds between SIS and new phases (hydroxyapatite), and the scaffolds performance steadily increased at near the physiological conditions. Finally, biocompatibility of the scaffolds was evaluated by CCK8, bionic microstructure scaffolds are nocytotoxicity and their biocompatibility is favorable. Based on the microstructure, compressive strength and cytotoxicity of the scaffolds, bionic Harvarsin microstructure CPC/SIS composite scaffold is expected to turn into a scaffold with the excellent porperties of real bone.

Key words: the bionic Haversin microstructure, calcium phosphate cement/small intestinal submucosa, rolling motifs, the specific surface area, biocompatibility.