

Porous SHA/PEEK scaffolds for biomedical applications

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ABSTRACT

Hydroxyapatite (HA, $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$), resembling the bone apatite, possesses excellent biocompatibility and osteoconductivity. It has been used clinically as a bioactive material in the form of powder, porous structure, or dense body over last 20 years. In incorporation with polyetheretherketone (PEEK), which has high strength, good resistance to chemicals and radiation, HA/PEEK composites have the potential to combine the desired mechanical performance of PEEK and the bioactivity of HA for hard tissue applications. In this study, porous HA/PEEK scaffolds with 30 to 70% porosity were prepared by leaching out a dissolved phase. Evaluation for HA/PEEK scaffolds included diametral compressive test and bioactivity in simulated body fluid (SBF) solution. The diametral compressive test results showed that the strength dramatically decreases with increasing porosity. Bone-like apatite formation was observed on the surface of scaffolds after 7 days immersion in SBF. These results suggest the benefits of HA/PEEK composites as a potential substitute material for hard tissue replacement.

Keywords: Hydroxyapatite (HA), scaffold, biocompatibility and bioactivity