

The effect of liquid phase concentration on the setting time and compressive strength of hydroxyapatite/bioglass composite cement

ABSTRACT

Composite scaffolds of hydroxyapatite (HAp) nanoparticles and bioactive glass (BG) have been applied as appropriate materials for bone tissue engineering. In this study, hydroxyapatite/bioglass cement in different ratios was successfully fabricated. To prepare HAp and HAp/BG cement, synthesized HAp and HAp/BG powder were mixed in several ratios, using different concentrations of sodium hydrogen phosphate (SP) and water as the liquid phase. The liquid to powder ratio used was 0.4 mL/g. The results showed that setting time increased with BG content in the composite. The results also showed that with the addition of bioglass to the HAp structure, the density decreased and the porosity increased. It was also found that after immersion in simulated body fluid (SBF) solution, the compressive strength of the HAp and HAp/BG cements increased with BG concentration up to 30 wt.%. SEM results showed the formation of an apatite layer in all selected samples after immersion in SBF solution. At 30 wt.% BG, greater nucleation and growth of the apatite layer were observed, resulting in higher bioactivity than pure HAp and HAp/BG in other ratios.