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Highly bioactive polysiloxane modified bioactive glass-poly(ethylene glycol) hybrids monoliths with controlled surface structure for bone tissue regeneration

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Abstract

Crack-free monoliths with controllable surface microstructure have high bioactivities and therefore potential applications in bone tissue regeneration. In this paper, crack-free polydimethylsiloxane -modified bioactive glass-poly (ethylene glycol) (PDMS-BG-PEG) hybrids monoliths were fabricated via using a modified sol-gel process. Results show that the addition of PEG plays an important part in the formation of crack-free and gelation of the monoliths, and surface microstructures of the as-prepared hybrid monoliths were significantly influenced by the concentration and molecular weight of PEG. The samples obtained from PEG 300 had porous surface result in higher bioactivity (apatite formation) in simulated body fluid (SBF), while the samples obtained from PEG 600 had the smooth surface and inhibited the formation of apatite layer in SBF. These as-prepared hybrid monoliths can be used as a good candidate of implant and scaffold for highly efficient bone tissue regeneration.

Keywords: Sol-gel process; Polydimethylsiloxane; Bioactive glass; Poly (ethylene glycol); Surface structure; Bioactivity;

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