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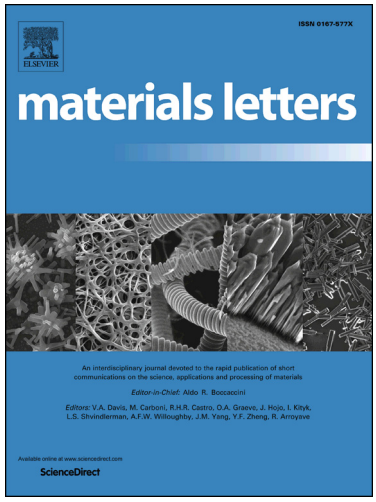

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Fe-doped bioactive glass-derived scaffolds produced by sol-gel foaming

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Abstract

Multifunctional scaffolds were prepared by foaming Fe-containing sols according to a composition-optimized approach. These foams exhibited high specific surface area (16-80 m^2/g) and hierarchical porosity from the macro- (50-600 μm) to the meso-scale (4-20 nm). The effects of iron content on the textural properties and *in vitro* bioactivity were investigated. It was observed that the increase of iron content involved a decrease of specific surface and mesopore size. Interestingly, an excellent apatite-forming ability was observed regardless of the material composition. The potential osteoconductivity of these bioactive foams, coupled with their ferrimagnetic properties, open new perspectives as regards the hyperthermia-assisted treatment and regeneration of osseous defects caused by bone cancer.

Keywords: Biomaterials; Bioactive glass; Sol-gel preparation; Porous materials; Scaffold; Hyperthermia.

1. Introduction

The foaming of sol-gel bioactive glasses is a valuable approach to produce bone-like porous scaffolds [1]. Furthermore, as the foam is made from sol-gel glass, the solid network exhibits an inherent mesoporosity that enhances the apatite-forming ability compared to melt-derived glasses [2]. Typical compositions selected to produce sol-gel-derived foams include