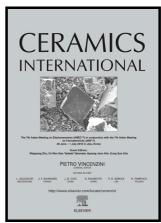
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Structural and microstructural comparison of bioactive melt-derived and gel-derived glasses from CaO-SiO₂ binary system

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Structural and microstructural comparison of bioactive melt-derived and gel-derived

glasses from CaO-SiO₂ binary system

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Abstract

Two glasses from CaO-SiO₂ binary system were obtained by sol-gel and melting

techniques. The effect of two different glass obtaining methods was investigated using X-ray

diffraction, FTIR, Raman and ²⁹Si MAS-NMR spectroscopic methods. The measurements

revealed significant differences in the glasses structure. Although both glasses were fully

amorphous, the gel-derived glass had a more polymerized structure compared to the melt-

derived one. The studied glasses were characterized by BET analysis to provide information

about specific surface area of the obtained materials. Apart from microstructural evaluation,

thermal properties and in vitro bioactivity study of all glasses were conducted to demonstrate

differences in performance of the samples. The formation process of hydroxycarbonate apatite

(HCA) layer was investigated using inductively coupled plasma mass spectrometry (ICP-MS)

and structural studies.

Keywords: bioactive glasses, spectroscopic studies, sol-gel derived glass, melt-derived glass

1. Introduction

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