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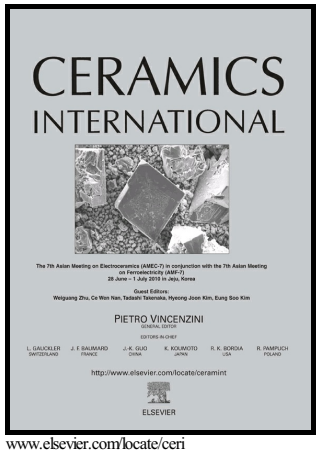

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Synthesis of nanoporous Baghdadite by a modified sol-gel method and its structural and controlled release properties

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Abstract

In this research, a bimodal nanoporous Baghdadite (NB) ($Ca_3ZrSi_2O_9$) was prepared by a modified sol-gel method using P123 as a surfactant. The effects of P123's contents on the structural and textural properties as well as the drug delivery behavior of NB were assessed *in vitro*. The usage of P123 offered a new route for the synthesis of NB. The synthesized NB samples with different amounts of P123 were studied through X-ray diffraction (XRD), Fourier transform infrared spectra (FTIR), N_2 adsorption-desorption, field emission scanning electron microscopy (FESEM) equipped with energy-dispersive X-ray analysis spectroscopy (EDAX) and transmission electron microscopy (TEM). The results showed that a single-phase Baghdadite was obtained by this new method at the calcination temperature of 800 $^{\circ}$C. It was found that an increase in P123's content up to 0.025 mol changed the morphology of NB samples from mountain-like to needle-like. The potential application of NB samples as drug delivery agents was assessed by estimating their release properties up to 240 h. This research revealed that the synthesized Baghdadite could be used as a potential nanoporous carrier with controlled release capability in bone tissue regeneration.

Key Words: Baghdadite; Sol-gel; Drug Delivery; Bone Tissue Engineering.