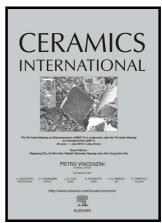
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ACCEPTED MANUSCRIPT

Synthesis of nanoporous Baghdadite by a modified sol-gel method and its struct

ural and controlled release properties

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Abstract

In this research, a bimodal nanoporous Baghdadite (NB) (Ca₃ZrSi₂O₉) was prepared by a mo

dified sol-gel method using P123 as a surfactant. The effects of P123's contents on the structu

ral 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 transf

orm infrared spectra (FTIR), N2 adsorption-desorption, field emission scanning electron micr

oscopy (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 °C. It was found that a

n increase in P123's content up to 0.025 mol changed the morphology of NB samples from m

ountain-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 th

e synthesized Baghdadite could be used as a potential nanoporous carrier with controlled rele

ase capability in bone tissue regeneration.

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

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