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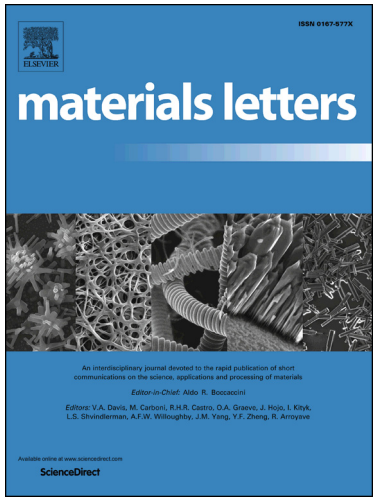

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A Novel Approach for Synthesis of Monticellite Based Bioactive Ceramic Powders from Boron Derivative Waste

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Abstract

Monticellite bioactive ceramics have a high usage potential as bone graft substitutes due to their superior mechanical properties compared to hydroxyapatite and excellent bioactivity. Turkey has almost 72 % of the global boron reserves and the fairly high amount of emerged boron derivative waste causes storage problems and environmental pollutions. The aim of this study was the solid state synthesis of monticellite based ceramic powders from boron derivative waste and the evaluation of bioactivity characteristic of produced powders. The monticellite based ceramic powders were synthesized at low temperature (800°C). The powders were incubated in Simulated Body Fluid and their surfaces were examined using a scanning electron microscope. The surfaces of synthesized powders were bioactive and allowed formation of bone-like apatite layer within 15 days. Results of the study confirmed that cost-effective and eco-friendly monticellite based bioactive ceramic powders can be synthesized from boron derivative waste.

Keywords: Monticellite ($CaMgSiO_4$), Bioactive ceramics, Powder synthesis, Boron derivative waste, Simulated body fluid

1. Introduction

In last four decades, bioactive ceramics have attracted much attention as bone graft substitutes due to their outstanding biocompatibility and bioactivity characteristics, which provides strong implant-bone bond by the formation of a bone-like apatite layer at the tissue-implant interface [1-6]. Among developed bioactive