

A New Approach to Bioglass Composition: Investigation of the Effects of Increasing Amounts of Silica and Calcia on the Properties of Bioglass

Burcu N. Çetiner¹, Hayrunnisa ARIKANLI², Z. Engin Erkmen^{1*}

¹ Marmara University, Dept. Of Metallurgical and Materials Engineering, Göztepe Campus, İstanbul

² Marmara University, Dept. Of Metallurgical and Materials Engineering (Graduate Student), Göztepe Campus, İstanbul

* Corresponding author: eerkmen@marmara.edu.tr

Abstract

Since 45S5 Bioglass[®] were first discovered by Hench et al. in 1969, several other compositions of bioglass with different osteoinductive and osteoconductive properties. In this research, a new silica based bioglass with increased amounts of silica and calcia of composition 50,15 wt % SiO₂, 15,95 wt % Na₂O, 27,9 wt % CaO, 6 wt % P₂O₅ was investigated. The powders constituting this new bioglass composition were weighed, mixed and melted in a Pt crucible for 3 h at 1550 °C in the bottom loading furnace. The melt was then quenched in water and ground to a finer powder for a better homogenization of the glass. As the glass has amorphous structure because of its rapid solidification upon quenching in water, its crystallization process has been performed by sintering in 1000 °C to observe the peaks of the formed crystals, by XRD following the DSC and dilatometric measurements. Its microstructure was characterized using SEM.

Key Words: Bioglass, bioceramic material, thermal characterization