



## Synthesis and Analysis of Bioactive Glass Ceramic of Varying Lithium Content

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### Abstract

There has been an increased clinical use of bio active glasses as it can bond to hard tissue and release therapeutic ions that stimulate specific cellular activity in nearby cells. Lithium, when added to bio active glass, plays important roles in the formation and repair of bone and teeth. The present investigation intends to study the bioactivity and other physico-mechanical properties of glass and glass ceramics by gradual replacement of sodium by lithium. The preparation of bioactive glass went through the conventional melt quenching process at a temperature of  $1450 \pm 10$  °C (using electrical furnace) by gradual increase of the proportion of  $\text{Li}_2\text{O}$  and decrease of the proportion of  $\text{Na}_2\text{O}$ . The controlled crystallizations were carried out to convert the bioactive glasses to their corresponding bioactive glass ceramic. The structural properties of glass were investigated by X-ray diffraction (XRD), Fourier transform infrared spectrometry (FTIR), scanning electron microscopy (SEM) and the bioactivity of the glasses was evaluated by in vitro test in simulated body fluid (SBF). Nucleation and crystallization regimes were analyzed by differential thermal analysis (DTA). The result obtained suggested that this novel  $\text{SiO}_2\text{-Na}_2\text{O-CaO-P}_2\text{O}_5\text{-Li}_2\text{O-MgO-B}_2\text{O}_3$  based bioactive glass contains appropriate mechanical, physical and chemical properties and can be considered as potential materials for biomedical applications.

**Keywords:** *Bioactive glass ceramics, Lithium, Melt quench method, Controlled crystallization, Nucleation, Crystallization*

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