

The additive roles on the microstructure and sintering properties of $\text{Li}_2\text{O} \cdot 2\text{SiO}_2$ glass ceramics

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The $\text{Li}_2\text{O} \cdot 2\text{SiO}_2$ glass ceramics draw current research attention due to its specific nucleation phenomena as well as its application in dental clinic. In this investigation a series of heat treatment on the material as additives were chosen based on Al_2O_3 , MgO , K_2O , and P_2O_5 , were undertaken. The optimum heat treatment and composition were supposed to be obtained. As well, a process of making fine crystal microstructure by sintering individual sheets that were nucleated beforehand and then stacked by sintering twice was also described currently. As compared, the role of additive in the place of P_2O_5 , such as ZrO_2 and TiO_2 on the microstructure and sintering property were also tested, respectively. This investigation provided an approach of preparing $\text{Li}_2\text{O} \cdot 2\text{SiO}_2$ glass ceramics with fine crystals and favorable hardness values. A conclusion is drawn that ZrO_2 and TiO_2 have less positive role than P_2O_5 in the chosen glass ceramic composition. Scanning electron microscopy (SEM) and X-ray diffraction (XRD) was employed to observe the microstructure and determine final products, respectively. Hardness value was measured as the reference of the mechanical property.