

Effect of High Pressure in Crystallization and physics properties of Lithium disilicate glass-ceramic

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Glass-ceramics are polycrystalline materials produced by controlled crystallization of suitable glasses during heat treatment processes. Lithium disilicate glass ($\text{Li}_2\text{O} \cdot 2\text{SiO}_2$) is a very interesting vitreous material due to the large difference between T_g and T_c . In this work it will be presented the effect of high pressure on mechanical, thermal and optical properties of lithium disilicate glass ($\text{Li}_2\text{O} \cdot 2\text{SiO}_2$). It will also be discussed the structural changes induced by pressure on the amorphous phase. The experimental results were obtained using a toroidal type high-pressure chambers up to 7.7 GPa in controlled temperature. X-ray diffraction data using synchrotron radiation allowed the investigation of the effect of high pressure on the radial distribution function (RDF). Mechanical properties were investigated by instrumented indentation test and thermal properties were evaluated by differential thermal analysis. The densification increased the hardness and elastic modulus and, also, the refractive index of the glass. Distinct phases were observed after the glass was processed under high pressure and high temperature: crystalline lithium disilicate, metasilicate, coesite and quartz, depending on pressure.