Lithium disilicate glass produced by High Pressure: Alternative route for increasing in mechanical properties of glass.

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Glasses are defined as amorphous solids, obtained from quenching of liquids. Conventionally, glasses are prepared from melting of oxides. When these molten substances are quenched, preventing crystallization, the glass is formed. Some studies are focused on increasing the mechanical properties of glasses, either by the inclusion of other elements in the composition of the glass, or by controlling crystallization, forming a glass-ceramic. This work aims to use the high pressure technique as an alternative route to obtain dense glasses, and consequently, with high mechanical properties compared to the glasses produced by the conventional route at atmospheric pressure. Samples of lithium disilicate glass (Li2O.2SiO2) were synthesized under high pressures (up to 7.7 GPa) and temperatures up to 1600ºC. The samples were cooled under pressure in order to maintain the amorphous structure. The samples were analyzed by X-ray diffraction in order to verify the glass formation. Thermal analysis was used to identify the glass transition and crystallization temperatures. The mechanical properties of the samples were measured by Vickers microhardness. Results indicate that the glass was formed, as the X-ray diffraction patterns showed an amorphous material. The microhardness measurements of samples produced at high pressure compared to samples produced at atmospheric pressure indicated an increase of approximately 30% in the values of this mechanical property, which is a promising result.