
Effect of Li₂O excess on the crystallization sequence of LAS glass powders

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Abstract

The surface crystallization of melt-quenched lithium aluminosilicate (LAS) glasses with SiO₂-contents between 77 and 79 mol% was investigated by high-temperature X-ray diffraction. Glasses possessing a ratio Li/Al > 1 underwent far earlier crystallization (starting from 750 °C) than their stoichiometric counterparts, developing solely quartz solid solution (Qss) and keatite solid solution (Kss) crystals during a heat treatment up to 1200 °C. In turn, samples with Li/Al = 1 devitrified only above 900 °C and exhibited the transient formation of cristobalite, whose lattice constants hint at a slight Li+Al stuffing. The composition, structural parameters and critical inversion temperature T_c of the obtained Qss crystals were analyzed and compared with the available literature sources, reaffirming the established mutually linear dependence between these properties.

Keywords: glass, crystallization, quartz solid solution, lithium aluminosilicate, quartz inversion

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