
Surface and Volume Crystallization in a SrOCaOB₂O₃SiO₂ glass

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Abstract

The knowledge of the dominant crystallization mechanism and the corresponding structure of a given glass ceramic is highly required, since most of the applications of those materials depend on these characteristics. In this paper, a CaO-SrO-B₂O₃-SiO₂ glass composition was prepared by melting/quenching. In the next, bulk glass samples were heat-treated in a tubular furnace at temperatures above T_g for different periods of time (T_g + 680°C). The evolution of the crystalline phases formed after crystallization at 850°C for a wide time interval (20h – 382h) was investigated by X-ray diffraction (XRD). Using Raman Confocal Microscopy, the Raman spectra of the partially crystallized glass samples were collected at room temperature, at a wavelength range between 200 and 1200 cm⁻¹. From the SEM micrographs, well-separated crystals were found in the surface (dendritic) as well as in the volume (spherulithic), with well-distinctive crystal growth rates. In addition, as demonstrated by the Raman spectra, these crystals belong to the same crystalline phase.

Keywords: glass, crystal growth rates, raman spectra

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