

Effect of excess mgo mole ratio in a stoichiometric cordierite ($2\text{MgO} \cdot 2\text{Al}_2\text{O}_3 \cdot 5\text{SiO}_2$) composition on the phase transformation and crystallization behavior of magnesium aluminum silicate phases

Abstract

The effect of excess MgO, 2.0-4.0 mol ratios on the crystallization behavior and purity of μ -cordierite was investigated using X-ray diffraction (XRD), differential thermal analyzer, and TGA. Quantitative XRD, the Rietveld technique, was carried out using the HighScore Plus software. The glass crystallization process route was used with talc and kaolin as the main raw materials and compensated with MgO, Al_2O_3 , and SiO_2 accordingly. The crystallization temperature of the glasses decreased as a function of the MgO mole ratio. Less than 2.8 mol MgO increased the formation of α -cordierite up to 94 wt%. However, above 2.8 mol ratio, the forsterite phase started to appear, together with mullite, μ -cordierite, and spinel.