
Crystallization and ordering process in stoichiometric cordierite glass-ceramics with TiO₂ as nucleating agent

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Abstract

Glass samples of stoichiometric cordierite composition, increasingly doped with TiO₂ as nucleating agent, were ceramized up to 1300°C and analysed to highlight differences in their crystalline evolution. Employed analytical methods included (HT)-XRD, DSC, Raman spectroscopy and SEM. The specimens displayed a gradual transition to effective bulk crystallization with increasing TiO₂-doping, manifested by earlier and sharper formation of HQss. The further phase transformation into indialite equally appeared to be influenced by TiO₂-content and to be closely related to the compositional and structural evolution of the seed formers, Mg-Al-titanate and rutile. Furthermore, the indialite-cordierite ordering process was investigated by computation of Miyashiro's index[1] and Raman splitting at various temperatures: remarkable differences in ordering were spotted between surface and bulk of the samples, again hypothesized to be connected to the stability of Ti-bearing phases.

References:

A. Miyashiro, Cordierite-indialite relations, J. Am. Sci. 255 (1954) 43-62

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