عنوان مقاله:

Crystallization behavior and structural evaluation of cordierite base glass-ceramic in the presence of CaO and B۲O۳ additives

محل انتشار:

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خلاصه مقاله:

The purpose of the present work is to highlight the role of CaO and B۲O۳ additives on the crystallization behavior and microstructural properties of stoichiometric cordierite glass-ceramics using differential thermal analysis (DTA), X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), Vickers micro-hardness and scanning electron microscopy (SEM). The results show that the presence of B۲O۳ and CaO in the initial glass led to the precipitation of only one exothermic peak (α-cordierite: Mg۲Al۴Si۵O۱۸). During the heat treatment process, the presence of calcium oxide favors crystallization of anorthite (CaAl۲Si۲O۸) besides α-cordierite phase. It is worth mentioning that, CaO and B۲O۳ additives strongly encourage the formation of α-cordierite and have the opposite effect on the crystallization of μ-cordierite. In order to determine the effect of crystallization and B۲O۳ and CaO additives on the hardness of specimens, the micro-hardness measurement of glasses and glass-ceramics shows that the glass-ceramic containing CaO (MAS۵C) exhibits the highest micro-hardness value, which depends on the high crystallinity value in this specimen.The purpose of the present work is to highlight the role of CaO and B۲O۳ additives on the crystallization behavior and microstructural properties of stoichiometric cordierite glass-ceramics using differential thermal analysis (DTA), X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), Vickers micro-hardness and scanning electron microscopy (SEM). The results show that the presence of B۲O۳ and CaO in the initial glass led to the precipitation of only one exothermic peak (α-cordierite: Mg۲Al۴Si۵O۱۸). During the heat treatment process, the presence of calcium oxide favors crystallization of anorthite (CaAl۲Si۲O۸) besides α-cordierite phase. It is worth mentioning that, CaO and B۲O۳ additives strongly encourage the formation of α-cordierite and have the opposite effect on the crystallization of μ-cordierite. In order to determine the effect of crystallization and B۲O۳ and CaO additives on the hardness of specimens, the micro-hardness measurement of glasses and glass-ceramics shows that the glass-ceramic containing CaO (MAS۵C) exhibits the highest micro-hardness value, which depends on the high crystallinity value in this specimen.

کلمات کلیدی:

Glass-ceramic, Cordierite, Crystallization, Heat treatment

لینک ثابت مقاله در پایگاه سیویلیکا: