无机材料学报 2007 22 (1): 35-39 ISSN: 1000-324X CN: 31-1363/TQ

CeO_2对镁铝硅钛系统微晶玻璃的相变和介电性能影响

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收稿日期 2006-2-17 修回日期 2006-3-31 网络版发布日期 接受日期

摘要 运用DTA、XRD、SEM等测试手段, 研究了CeO_2 添加到$MgO-Al_2O_3-SiO_2-TiO_2$ 系统后玻璃的形成、相变和介电性能. 研究结果表明, 在$MgO-Al_2O_3-SiO_2-TiO_2$ 系统中引入CeO_2可以降低玻璃的析晶倾向, 玻璃的相变过程也随之变化, 随着CeO_2含量的增加, 硅钛铈矿相出现, 金红石和堇青石的相对含量均有所减少, 而硅钛铈矿相的相对含量不断增加. 在微波频率下(10GHz), 材料的介电常数可在7.5~10.5范围内调控, 介电损耗<5.5×10^{-4}.

关键词 微晶玻璃 微波材料 镁铝硅钛铈玻璃

分类号 TQ174

Phase Transition and Dielectric Properties of $MgO-Al_2O_3-SiO_2-TiO_2$ Glass-ceramics Adding CeO_2

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Abstract The glass-forming, the crystallization process and microwave dielectric properties of $MgO-Al_2O_3-SiO_2-TiO_2$ system glasses adding CeO_2 were investigated by means of DTA, XRD, SEM. Results show that spontaneous crystallization of the $MgO-Al_2O_3-SiO_2-TiO_2$ system glasses is obviously prevented with the increass of CeO_2 content. After heat treatment (nucleation at 770℃ for 4h and cryatal growth at 1200℃ for 1.5h) the crystallized volume fraction of rutile and cordierite decrease and that of perrierite increases. The glass-ceramics obtained by crystallization of the glasses have dielectric constant of 7.5--10.5, and microwave loss less than 5.5×10^{-4}.

Key words glass-ceramics microwave materials MgO-Al2O3-SiO2-TiO2-CeO2 system glass

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