

## Cr<sub>2</sub>O<sub>3</sub>的添加对MgO-Al<sub>2</sub>O<sub>3</sub>-SiO<sub>2</sub>-TiO<sub>2</sub>系统微晶玻璃析晶行为的影响

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**摘要** 利用DTA、XRD、SEM和TEM等实验手段,研究了 Cr<sub>2</sub>O<sub>3</sub>的添加对MgO-Al<sub>2</sub>O<sub>3</sub>-SiO<sub>2</sub>-TiO<sub>2</sub>系统微晶玻璃析晶行为的影响.同时,通过Ozawa和Kissinger方法计算出系统中 $\alpha$ -堇青石的析晶活化能E.研究表明,少量Cr<sub>2</sub>O<sub>3</sub>的添加并不改变MgO-Al<sub>2</sub>O<sub>3</sub>-SiO<sub>2</sub>-TiO<sub>2</sub>系统玻璃析出的晶相类型,但是提高了玻璃转化温度 $T_g$ ,降低了 $\alpha$ -堇青石的析晶活化能.由于析晶活化能的降低,促进了 $\alpha$ -堇青石的析出,最终获得了一种有实用价值的微波介质材料.该材料在微波频率下(10GHz)的相对介电常数约5.5,介电损耗 $<7 \times 10^{-4}$ .

**关键词** [堇青石](#) [微晶玻璃](#) [析晶活化能](#) [介电性能](#)

**分类号** [TQ171](#)

## Effects of Cr<sub>2</sub>O<sub>3</sub> Additive on Crystallization Behavior of MgO-Al<sub>2</sub>O<sub>3</sub>-SiO<sub>2</sub>-TiO<sub>2</sub> Glass-ceramics

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### Abstract

The crystallization behavior of MgO-Al<sub>2</sub>O<sub>3</sub>-SiO<sub>2</sub>-TiO<sub>2</sub> glasses containing Cr<sub>2</sub>O<sub>3</sub> was investigated by means of differential thermal analysis (DTA), X-ray diffraction (XRD), scanning electron microscope (SEM) and transmission electron microscope (TEM). The crystallization activation energy (E) was also calculated by Ozawa and Kissinger methods. The results show that the initial precipitated phase and the main crystal phase are not changed by the Cr<sub>2</sub>O<sub>3</sub> addition. Meanwhile, the glass transition temperature ( $T_g$ ) increases and the crystallization apparent activation energy decreases. As a result the E values of cordierite is decreased, the formation of cordierite crystals is promoted. The glass-ceramic obtained by crystallization of the glass has dielectric constant around 5.5, and dielectric loss less than  $7 \times 10^{-4}$ .

**Key words**  [\$\alpha\$ -cordierite](#) [glass-ceramics](#) [crystallization activation energy](#) [dielectric property](#)

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