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含Co、Ni、Fe锂铝硅玻璃的析晶机制

郭兴忠^{1, 2}, 杨辉^{1, 2}, 沈哲¹, 陈明形³, 项延杭³

- (1. 浙江大学 材料科学与工程学系, 杭州 310027;
2. 浙江大学 绿色建材与应用技术工程研究中心, 杭州 310027;
3. 温州市康尔微晶器皿有限公司, 温州 325802)

摘要: 以 $\text{Li}_2\text{O}-\text{Al}_2\text{O}_3-\text{SiO}_2$ (锂铝硅)微晶玻璃为研究对象, 采用DTA、XRD、IR和SEM等测试技术研究含 Fe_2O_3 、 Co_2O_3 、 Ni_2O_3 锂铝硅玻璃的析晶动力学和晶化过程, 分析着色剂成分 Co_2O_3 、 Ni_2O_3 对锂铝硅玻璃晶化过程及结构的影响机制。结果表明: 着色剂成分不仅决定锂铝硅微晶玻璃的着色度, 而且还影响锂铝硅玻璃的析晶过程和显微结构; 着色剂的加入可提高锂铝硅玻璃的析晶温度, 但降低析晶动力学参数, 且高 Co_2O_3 含量的降幅大于高 Ni_2O_3 含量的。着色剂对锂铝硅玻璃析晶能力的影响主要与着色离子的离子半径、电场强度及对断裂硅氧四面体联结能力有关。

关键字: 微晶玻璃; 锂铝硅酸盐; 着色剂; 析晶动力学

Crystallization mechanism of lithium aluminosilicate glass containing Co, Ni and Fe

GUO Xing-zhong^{1, 2}, YANG Hui^{1, 2}, SHEN Zhe¹,
CHEN Ming-xing³, XIANG Yan-hang³

- (1. Department of Materials Science and Engineering, Zhejiang University, Hangzhou 310027, China;
2. Green Constructional Materials and Applied Technology Engineering Research Center, Zhejiang University, Hangzhou 310027, China;
3. Wenzhou Kanger Crystalline Vessel Limited Company, Wenzhou 325802, China)

Abstract: The crystallization process and kinetics of $\text{Li}_2\text{O}-\text{Al}_2\text{O}_3-\text{SiO}_2$ (LAS) glass ceramic containing colouring agent such as Fe_2O_3 , Co_2O_3 and Ni_2O_3 were investigated using differential thermal analysis, X-ray diffractometry, infrared and scanning electron microscope, and the effects of Co_2O_3 and Ni_2O_3 on the crystallization mechanism of LAS glass were analyzed. The results show that the colouring agent not only changes the colority of LAS glass and also affects the crystallization process and microstructure of LAS glass. The addition of colouring agent increases the crystallization temperature of LAS glass and decreases the crystallization mechanism parameter, and the effect of Co_2O_3 on the

crystallization mechanism is much more than that of Ni₂O₃. The effect mechanism of colouring agent on the crystallization of LAS glass is related to the ion radius, field energy of colouring ions and their connection to the broke SiO₄.

Key words: glass ceramic; lithium aluminosilicate; colouring agent; crystallization kinetics

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地 址：湖南省长沙市岳麓山中南大学内 邮编： 410083

电 话： 0731-8876765, 8877197, 8830410 传真： 0731-8877197

电子邮箱： f-ysxb@mail.csu.edu.cn