

固相反应法制备 Ce:LuAG透明陶瓷

李会利^{1,2}, 刘学建¹, 黄莉萍¹

1. 中国科学院上海硅酸盐研究所结构中心, 上海 200050; 2. 中国科学院研究生院, 北京 100049

收稿日期 2005-11-3 修回日期 2005-12-6 网络版发布日期 接受日期

摘要 以 $\text{Lu}(\text{NO}_3)_3$ 和 NH_4HCO_3 为原料, 采用沉淀法制备了平均粒径约为40nm的 Lu_2O_3 粉体, 以该粉体和市售的 Al_2O_3 、 CeO_2 超细粉体为原料, 采用固相反应工艺, 经1760℃真空烧结10h, 制备出透明的Ce:LuAG陶瓷, 该透明陶瓷在可见光范围内的透过率为56%,

X射线激发下的发射光谱为 Ce^{3+} 的特征发射, 范围在470~650nm, 和同类单晶的光谱一致, 正好在硅光电二极管的高敏感曲线范围内, 满足于闪烁体的性能要求, 是一种有应用前景的闪烁材料.

关键词 [LuAG](#) [透明陶瓷](#) [固相反应](#), [发射光谱](#)

分类号 [TQ174](#)

Fabrication of Transparent Ce: LuAG Ceramics by a Solid-state Reaction Method

LI Hui-Li^{1,2}, LIU Xue-Jian¹, HUANG Li-Ping¹

1. Shanghai Institute of Ceramics, Chinese Academy of Sciences, Shanghai 200050, China; 2. Graduate University of Chinese Academy of Sciences, Beijing 100049, China

Abstract Lu_2O_3 powders with an average particle size of about 40nm were produced by a precipitation method using $\text{Lu}(\text{NO}_3)_3$ and NH_4HCO_3 as starting materials. The precipitation precursor is amorphous and transforms into pure Lu_2O_3 phase by calcining at 600℃ for 2h. The resultant Lu_2O_3 , Al_2O_3 and CeO_2 powders were mixed by ball milling, and then sintered into a fully transparent Ce:LuAG ceramic body by vacuum sintering at 1760℃ for 10h and annealed at 1450℃ for 20h. The resultant transparent ceramic has a uniform microstructure with an average grain size of about 4μm. The polished Ce:LuAG ceramic disk with 1.2mm thickness is highly transparent. The transmittance in the visible region reaches 56%, which is 72% of the theoretical value. The emission spectrum at 470~650nm with the double peak structure (517nm and 552nm) excited by X-ray is the characteristic spectrum of Ce^{3+} due to the 5d-4f transition, is consistent with that of LuAG:Ce single crystals, well coupled with the silicon photodiodes and satisfies the property requirements of a scintillator. Ce:LuAG transparent ceramics is a promising scintillating material.

Key words [LuAG](#) [transparent ceramics](#) [solid-state reaction](#) [emission spectrum](#)

DOI:

通讯作者 李会利 lihuli@mail.sic.ac.cn

扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF\(512KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [复制索引](#)

▶ [Email Alert](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

相关信息

▶ [本刊中 包含“LuAG”的 相关文章](#)

▶ 本文作者相关文章

· [李会利](#)

· [刘学建](#)

· [黄莉萍](#)