



材料合成及性能

Ce³⁺/Eu²⁺共掺Ca₃Si₂O₄N₂荧光粉的光学特性

陈鸿¹, 李晨霞¹, 华有杰², 徐时清²

1. 中国计量学院 光学与电子科技学院, 浙江 杭州 310018;
2. 中国计量学院 材料科学与工程学院, 浙江 杭州 310018

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摘要： 采用高温固相法制备了一种新型的白光LED用Ca₃Si₂O₄N₂:Eu²⁺,Ce³⁺,K⁺ 荧光粉。利用X射线衍射仪对样品的物相结构进行了分析,结果表明:Ce³⁺和 K⁺离子的掺杂没有改变 Ca₃Si₂O₄N₂:Eu²⁺荧光粉的主晶相。利用荧光光谱仪对样品的发光性能进行了测试,发现样品在355 nm激发下得到的发射光谱为峰值位于505 nm的单峰,是 Eu²⁺离子5d-4f 电子跃迁引起的。Ca₃Si₂O₄N₂:Eu²⁺荧光粉通过Ce³⁺和 K⁺离子的掺杂,发光明显增强。当Ce³⁺的摩尔分数为1%时,荧光粉的发光强度达到最大值,是单掺Eu²⁺离子荧光粉发光强度的168%。通过光谱重叠的方法计算Ce³⁺→Eu²⁺能量传递临界距离为2.535 nm。
关键词： Ca₃Si₂O₄N₂:Eu²⁺ Ce³⁺ 荧光粉 能量转移。

Photoluminescence Properties of Ce³⁺/Eu²⁺ Co-doped Ca₃Si₂O₄N₂ Phosphors

CHEN Hong¹, LI Chen-xia¹, HUA You-jie², XU Shi-qing²

1. College of Optical and Electronic Technology, China Jiliang University, Hangzhou 310018, China;
2. College of Materials Science and Energy, China Jiliang University, Hangzhou 310018, China

Abstract: A novel Ce³⁺/Eu²⁺ co-activated Ca₃Si₂O₄N₂ phosphor was synthesized by traditional solid-state reaction. The phosphors were characterized by X-ray diffraction (XRD) and fluorescence spectrophotometer (PL). XRD patterns reveal that the samples maintain Ca₃Si₂O₄N₂ single phase after doping Ce³⁺ and K⁺ ions. The emission spectra under 355 nm excitation show the typical broad band of Eu²⁺ peaking at about 505 nm (5d-4f). The emission could be greatly enhanced through doping Ce³⁺ and K⁺ in Ca₃Si₂O₄N₂:Eu²⁺ phosphors. K⁺ ions could be used as charge compensation in Ca₃Si₂O₄N₂:Eu²⁺,Ce³⁺ phosphors. When the mole fractions of Ce³⁺ and K⁺ are 1%, the emission intensity reach the maximum, which is about 168% of that of the sample without doping Ce³⁺ or K⁺. And the critical distance is calculated to be about 2.535 nm by the spectra overlap method.

Keywords: Ca₃Si₂O₄N₂:Eu²⁺ Ce³⁺ phosphors energy transfer

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通讯作者: 李晨霞, E-mail: lichenxia@cjlu.edu.cn

作者简介: 陈鸿(1989-), 男, 山西交城人, 主要从事发光材料的研究。E-mail: ch3516549@163.com

作者Email: lichenxia@cjlu.edu.cn

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