



材料合成及性能

Al₁₈B₄O₃₃: Cr³⁺ 荧光粉的制备及发光性质研究

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摘要： 采用高温固相法合成了Al₁₈B₄O₃₃: Cr³⁺ 荧光粉，使用X射线粉末衍射仪和FSEM对样品的结构和形貌进行了表征，采用荧光分光光度计及紫外分光光度计研究了样品的发光性质及光吸收性质。结果表明，在紫外光或530~630 nm可见光激发下，样品能够发射出660~720 nm的红光，两个发射峰分别位于683 nm和694 nm，其最佳激发波长为590 nm。当原料中Al和B的量比为3.5时，样品的发光最强。初步分析了H₃BO₃的加入对样品发光影响的机理。样品的最佳煅烧温度为1 150 ℃。随着Cr³⁺ 掺杂浓度的升高，样品发光增强，但发光效率降低。样品的漫反射光谱表明，样品对绿光、黄橙光及紫外光有较强的吸收，是一种潜在的优良农用转光剂材料。

关键词： 高温固相法 转光剂 Al₁₈B₄O₃₃: Cr³⁺

Preparation and Luminescence of Al₁₈B₄O₃₃: Cr³⁺ Phosphor

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Abstract: Al₁₈B₄O₃₃: Cr³⁺ phosphor was prepared by solid-state reaction method. The samples were characterized by X-ray diffraction, FSEM, reflectance spectra, fluorescence emission and excitation spectra. The results show that the samples can be excited by UV light and green-orange light in the range of 530~630 nm and show deep red emission at 660~720 nm. Two emission peaks are observed at 683 nm and 694 nm, the maximum excitation wavelength is 590 nm. When the initial molar ratio is n(Al)/n(B)=3.5, the sample gives the strongest emission. The effect of H₃BO₃ on fluorescence of the phosphor is briefly discussed. The optimized sintered temperature is 1 150 ℃. The fluorescence intensity of the phosphor increases with the Cr³⁺-doping concentration, and the fluorescence efficiency decreases with Cr³⁺-doping concentration. The reflectance spectra show that the samples have strong absorption in both UV and yellow-orange region and have a promising prospect in the light conversion material for agricultural applications.

Keywords: solid-state reaction method sunlight-conversion agent Al₁₈B₄O₃₃: Cr³⁺

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