



材料合成及性能

共掺Mo⁶⁺离子的Ca₄LaNbW₄O₂₀:Eu³⁺荧光粉的发光特性

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摘要: 采用高温固相法制备了红色荧光粉Ca₄LaNb(W_{1-x}Mo_x)₄O₂₀:Eu³⁺并研究了样品的发光性质。Ca₄LaNbW₄O₂₀:Eu³⁺的激发光谱中包含一个宽的激发带,峰值位于275 nm,归属于WO₄²⁻基团的电荷迁移跃迁。随着Mo⁶⁺离子的掺入,Ca₄LaNbW₄O₂₀:Eu³⁺位于275 nm处的吸收带变宽,其原因是O²⁻-Eu³⁺的电荷迁移跃迁增强。在Ca₄LaNb(W_{1-x}Mo_x)₄O₂₀:Eu³⁺的发射光谱中,400~500 nm间较宽的发射带属于WO₄²⁻基团的发射带,而位于591 nm和616 nm的尖锐的发射峰分别属于Eu³⁺的⁵D₀→⁷F₁磁偶极跃迁和⁵D₀→⁷F₂电偶极跃迁发射。随着Mo⁶⁺离子浓度的增加,WO₄²⁻基团的发射带强度下降,从而提高了色纯度。

关键词: Ca₄LaNb(W_{1-x}Mo_x)₄O₂₀:Eu³⁺ 红色荧光粉 光致发光

Photoluminescence Characteristics of Red-emitting Phosphors Ca₄LaNbW₄O₂₀:Eu³⁺ Incorporated with Mo⁶⁺ Ions

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Abstract: Red-emitting phosphors Ca₄LaNb(W_{1-x}Mo_x)₄O₂₀:Eu³⁺ were synthesized by the solid-state reaction, and the photoluminescence properties of these compounds were investigated. The excitation spectra of Ca₄LaNbW₄O₂₀:Eu³⁺ show a broad excitation band centered at 275 nm, which attribute to the charge transfer (CT) transition of WO₄²⁻ complex. With the introduction of Mo⁶⁺ ions into Ca₄LaNbW₄O₂₀:Eu³⁺, the absorption band at 275 nm broadens due to the enhancement of CT transitions of O²⁻-Eu³⁺. The emission spectra of Ca₄LaNb(W_{1-x}Mo_x)₄O₂₀:Eu³⁺ exhibit sharp emission peaks at 591 and 616 nm of Eu³⁺ transitions and a 400~500 nm broad emission band of WO₄²⁻ transition. With the increase of Mo⁶⁺ content, the intensity of broad emission band of WO₄²⁻ transition decreases. The pure red color is obtained.

Keywords: Ca₄LaNb(W_{1-x}Mo_x)₄O₂₀:Eu³⁺ red-emitting phosphor photoluminescence

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