



Synthesis, crystal structure, and luminescence properties of RbCaF₃:Eu³⁺ orange-red emitting phosphors for white light emitting diodes

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Abstract

A series of novel orange-red emitting RbCaF₃:0.05Eu³⁺ phosphors were synthesized by solid-state reaction technique. Phase formation and crystal structure of RbCaF₃ were investigated through powder X-ray diffraction patterns and Rietveld refinement. Through X-ray photoemission spectroscopy, their composition and nature of oxidation states were determined. These fluoroperovskite phosphors are efficiently excited by near ultraviolet (n-UV-394 nm) and a corresponding sharp emission peak is exhibited at 590nm. This peak can be attributed to the ⁵D₀→⁷F₁ transition of the magnetic dipole. A concentration quenching effect can be observed with increasing Eu³⁺ ion concentration. The Commission Internationale de l'Eclairage (CIE) chromaticity coordinates (x=0.5764, y=0.4277) of the RbCaF₃: 0.05Eu³⁺ phosphors excited at 394nm.




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