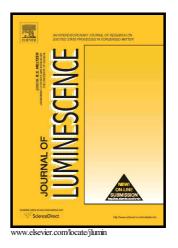
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Spectroscopic properties of K₄SrSi₃O₉ doped with Sm³⁺

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Abstract

 Sm^{3+} doped K₄SrSi₃O₉ red phosphor, was synthesized for the first time by the conventional solid state method. The X-ray powder diffraction confirmed that obtained phosphor was single phase. Excitation and emission spectra and decay curves were measured to characterize the luminescent properties of the obtained material. K₄SrSi₃O₉: Sm³⁺ exhibits red-orange luminescence originating mainly from equally intense ${}^{4}\text{G}_{5/2} \rightarrow {}^{6}\text{H}_{7/2}$ (with its maximum at 598.5 nm) and ${}^{4}\text{G}_{5/2} \rightarrow {}^{6}\text{H}_{9/2}$ (at 651 nm) transitions. The luminescence is quenched in the samples doped above 2% of Sm³⁺ due to non-radiative energy transfer between Sm ions at different sites. The interaction between Sm³⁺ ions is dipole-quadrupole type and the critical radius for energy transfer was calculated from Inokuti-Hirayama model to be 15.0 Å and 14.2 Å for 300 K and 77 K respectively.

Keywords: Silicates, luminescence, red phosphor, Sm³⁺, K₄SrSi₃O₉

1. Introduction

White LEDs (WLEDs) have many advantages compared to incandescent bulbs and even to so called "*energy efficient compact fluorescent light bulbs*", used in every household. Ones of the most significant advantages are longer service lifetime, lower working temperature and

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