

Author's Accepted Manuscript

Spectroscopic properties of $K_4SrSi_3O_9$ doped with Sm^{3+}

B. Bondzior, D. Stefańska, A. Kubiak, P.J. Dereń



PII: S0022-2313(15)30502-0
DOI: <http://dx.doi.org/10.1016/j.jlumin.2015.12.031>
Reference: LUMIN13775

To appear in: *Journal of Luminescence*

Received date: 15 September 2015
Accepted date: 16 December 2015

Cite this article as: B. Bondzior, D. Stefańska, A. Kubiak and P.J. Dereń Spectroscopic properties of $K_4SrSi_3O_9$ doped with Sm^{3+} , *Journal of Luminescence*, <http://dx.doi.org/10.1016/j.jlumin.2015.12.031>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain

Spectroscopic properties of $\text{K}_4\text{SrSi}_3\text{O}_9$ doped with Sm^{3+}

B. Bondzior, D. Stefańska, A. Kubiak, P.J. Dereń*

*Institute of Low Temperature and Structure Research, Polish Academy of Sciences,
ul. Okólna 2, 50-422 Wrocław, Poland*

* Corresponding author: P.Deren@int.pan.wroc.pl

Abstract

Sm^{3+} doped $\text{K}_4\text{SrSi}_3\text{O}_9$ 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. $\text{K}_4\text{SrSi}_3\text{O}_9: \text{Sm}^{3+}$ 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 Sm^{3+} due to non-radiative energy transfer between Sm ions at different sites. The interaction between Sm^{3+} 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, Sm^{3+} , $\text{K}_4\text{SrSi}_3\text{O}_9$

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

Download English Version:

<https://daneshyari.com/en/article/5398502>

Download Persian Version:

<https://daneshyari.com/article/5398502>

[Daneshyari.com](https://daneshyari.com)