Accepted Manuscript

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Author: R.B. Basavaraj H. Nagabhushana B. Daruka Prasad S.C. Sharma S.C. Prashantha B.M. Nagabhushana

PII: S0030-4026(15)00384-8

DOI: http://dx.doi.org/doi:10.1016/j.ijleo.2014.07.149

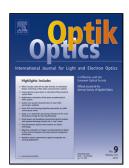
Reference: IJLEO 55567

To appear in:

Received date: 5-12-2013 Accepted date: 10-7-2014

Please cite this article as: R.B. Basavaraj, H. Nagabhushana, B.D. Prasad, S.C. Sharma, S.C. Prashantha, B.M. Nagabhushana, A single host white light emitting Zn₂SiO₄:Re³⁺ (Eu, Dy, Sm) phosphor for LED applications, *Optik - International Journal for Light and Electron Optics* (2015), http://dx.doi.org/10.1016/j.ijleo.2014.07.149

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ACCEPTED MANUSCRIPT

A single host white light emitting Zn_2SiO_4 : Re^{3+} (Eu, Dy, Sm) phosphor for LED applications

R.B.Basavaraj¹, H. Nagabhushana^{1*}, B. Daruka Prasad², S.C.Sharma³, S.C. Prashantha^{4*}, B.M. Nagabhushana⁵

¹Prof. C.N.R. Rao Centre for Advance Materials Research, Tumkur University, Tumkur-572103, India ²Department of Physics, B M S Institute of Technology, Bangalore – 560 064, India. ³Dayananda Sagar University, Shavige Malleshwara hills, Kumaraswamy layout, Bangalore 560 078, India

Abstract

We report photo and thermoluminescence properties of Zn₂SiO₄: Re³⁺ (Eu, Dy, Sm) phosphors prepared by low temperature solution combustion technique. The hexagonal phase was confirmed by PXRD patterns. SEM micrographs revealed that morphological features were highly dependent on type of the dopant ion. Characteristic excitation and emission peaks of Eu³⁺, Dy³⁺ and Sm³⁺ were observed from PL studies. The concentration quenching occurred for 3 mol% R³⁺ doped lanthanide ions, whose critical energy transfer distance (R_c) was found to be ~13 Å. The corresponding concentration quenching was verified to be dipole-dipole interaction. The chromaticity co-ordinates of Zn₂SiO₄:Eu³⁺/Dy³⁺/Sm³⁺ phosphors were located in white region suggests them to be a potential candidate for the production of white light emitting phosphors. Three TL glow peaks in Eu³⁺, Dy³⁺ doped and two glow peaks in Sm³⁺ doped Zn₂SiO₄ nanophosphor observed in TL studies indicated that more than one type of traps were created in these phosphors. TL intensity increases linearly in Sm³⁺ doped Zn₂SiO₄ upto 4 kGy and thereafter, it decreases. Upto 4 kGy, the phosphor was quite useful in radiation dosimetry.

Key words: Nanophosphors; morphological studies; luminescence; WLEDs; dosimetry

⁴Department of Science, East west Institute of Technology, Bengaluru-560091, India. ⁵Department of Chemistry, M.S. Ramaiah Institute of Technology, Bangalore- 560 054, India.

^{*} Corresponding author. Tel.: +91 9945954010, Tel.: +91 9886021344 E-mail: bhushanvlc@gmail.com (H. Nagabhushana). scphysics@gmail.com (Prashantha S.C)

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