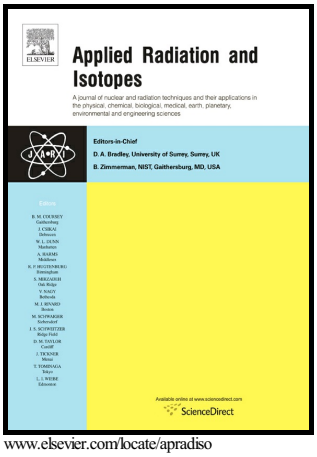

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Vikas Dubey, Jagjeet Kaur, Yogita Parganiha, N.S. Suryanarayana, K.V.R. Murthy

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Study of formation of deep trapping mechanism by UV, beta and gamma irradiated Eu^{3+} activated SrY_2O_4 and $Y_4Al_2O_9$ phosphors

Vikas Dubey[1], Jagjeet Kaur[2], Yogita Parganiha[2], N.S.Suryanarayana[2], [3]KVR Murthy

[1]Department of Physics, Bhilai Institute of Technology, Raipur, New Raipur-493661, India
[2]Department of Physics, Govt. Y.T.PG.Auto. College, Durg-491001, India
[3]Display Materials Laboratory, Applied Physics Department,
Faculty of Technology and Engineering,
The M. S. University of Baroda, Vadodara – 390001 India
Corresponding author: jsvikasdubey@gmail.com
H/P 0091 9826937919

Abstract:

This paper reports the thermoluminescence properties of Eu^{3+} doped different host matrix phosphors (SrY_2O_4 and $Y_4Al_2O_9$). The phosphor is prepared by high temperature solid state reaction method. The method is suitable for large scale production and fixed concentration of boric acid using as a flux. The prepared samples were characterized by X-ray diffraction technique and the particle size calculated by Scherer's formula. The prepared phosphor charecterized by Scanning Electron Microscopic (SEM), Fourier Transform Infrared (FTIR), Energy Dispersive X-ray analysis (EDX), thermoluminescence (TL) and Transmission Electron Microscopic (TEM) techniques. The prepared phosphors for different concentration of Eu^{3+} ions were examined by TL glow curve for UV, beta and gamma irradiation. The UV 254nm source used for UV irradiation, Sr^{90} source was used for beta irradiation and Co^{60} source used for gamma irradiation. SrY_2O_4:Eu^{3+} and $Y_4Al_2O_9$:Eu^{3+} phosphors which shows both higher temperature peaks and lower temperature peaks for UV, beta and gamma irradiation. Here UV irradiated sample shows the formation of shallow trap (surface trapping) and the gamma irradiated sample shows the formation of deep trapping. The estimation of trap formation was evaluated by knowledge of trapping parameters. The trapping parameters such as activation energy, order of kinetics and frequency factor were calculated by peak shape method. Here most of the peak shows second order of kinetics. The effect of gamma, beta and UV exposure on TL studies was also examined and it shows linear response with dose which indicate that the samples may be useful for TL dosimetry. Formation of deep trapping mechanism by UV, beta and gamma irradiated Eu^{3+} activated SrY_2O_4 and $Y_4Al_2O_9$ phosphors discuss in this paper.

Keywords: Thermoluminescence; effect of europium concentration; UV; beta; gamma; phosphors, radiation effect; TL dosimetry.

1. Introduction:

Thermoluminescence (TL) is a very important technique due to its applications in various fields such as radiation therapy; dosimetry, geology, space research and other research related are as [Bravim et al. 2011, Ricera et al. 2010, Ricera et al. 2012]. Studies on radiation induced defects in insulating and semiconducting materials have been interesting over the last few decades [Furetta et al. 2007]. Several materials such as LiF:Ti, Mg and α-Al_2O_3:C,