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Correlated PL, TL and EPR study in γ -rays and C^{6+} ion beam irradiated **$CaMg_2(SO_4)_3:Dy^{3+}$ triple sulphate phosphor****Sumedha Tamboli¹, R. M. Kadam², B. Rajeswari², Birendra Singh³, S. J. Dhoble^{1*}**¹Department of Physics, R. T. M. Nagpur University, Nagpur, India²Radiochemistry Division, Bhabha Atomic Research Centre, Trombay, India³Health Physics Department, Inter University Accelerator Centre, New Delhi-110067, India***Corresponding Author:** sjdhoble@rediffmail.com**Abstract**

$CaMg_2(SO_4)_3$ host and $CaMg_2(SO_4)_3:Dy^{3+}$ phosphor (where $Dy^{3+} = 0.05, 0.1, 0.2, 0.5$ and 1 mol%) were synthesized via solid state synthesis method at 700 °C. Phase formation of the compound was confirmed by obtaining its X-ray diffraction (XRD) pattern and the surface morphology was analysed with the scanning electron microscopy (SEM) technique. Photoluminescence (PL) excitation and emission spectra of $CaMg_2(SO_4)_3:Dy^{3+}$ phosphor shows characteristic emission and excitation peaks of Dy^{3+} ions, which confirms the doping of Dy^{3+} ions in the host. Material was irradiated with γ -rays and C^{6+} ion beam. Thermoluminescence (TL) glow curve of irradiated material was recorded at the heating rate of 5 °C s⁻¹. A single TL peak is obtained after γ -rays irradiation for $CaMg_2(SO_4)_3$ host at 158 °C and two TL peaks were seen for $CaMg_2(SO_4)_3:Dy^{3+}$ at 129 °C and 355 °C. With increase in Dy^{3+} concentration, TL intensity is increased but the nature of TL glow curve remained same. Material was quenched from 400 °C and its TL was recorded by irradiating it with γ -rays and C^{6+} ion beam (75 MeV). TL intensity of quenched $CaMg_2(SO_4)_3:Dy^{3+}$ compound enhanced significantly as compared to annealed $CaMg_2(SO_4)_3:Dy^{3+}$ compound. Electron paramagnetic resonance (EPR) study was carried out on irradiated (γ -ray and C^{6+} beam) $CaMg_2(SO_4)_3:Dy^{3+}$ compound to analyse radicals formed in the irradiation process and possible mechanism of TL. Correlated study of TL, PL and EPR is done.

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