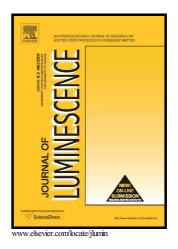
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## Correlated PL, TL and EPR study in $\gamma$ -rays and C<sup>6+</sup> ion beam irradiated CaMg<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>:Dy<sup>3+</sup> triple sulphate phosphor

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## Abstract

 $CaMg_2(SO_4)_3$  host and  $CaMg_2(SO_4)_3$ : Dy<sup>3+</sup> phosphor (where Dy<sup>3+</sup> = 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  $\gamma$ -rays and  $C^{6+}$  ion beam. Thermoluminescence (TL) glow curve of irradiated material was recorded at the heating rate of 5 °Cs<sup>-1</sup>. A single TL peak is obtained after  $\gamma$ -rays irradiation for CaMg<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> host at 158 °C and two TL peaks were seen for CaMg<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>:Dy<sup>3+</sup> at 129 °C and 355 °C. With increase in Dy<sup>3+</sup> concentration, TL intensity is increased but the nature of TL glow curve remained same. Material was quenched from 400  $^{\circ}$ C and its TL was recorded by irradiating it with  $\gamma$ rays and  $C^{6+}$  ion beam (75 MeV). TL intensity of quenched CaMg<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>:Dy<sup>3+</sup> 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 ( $\gamma$ -ray and C<sup>6+</sup> beam)  $CaMg_2(SO_4)_3:Dy^{3+}$  compound to analyse radicles formed in the irradiation process and possible mechanism of TL. Correlated study of TL, PL and EPR is done.

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