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## Thermoluminescence Study of Long Persistent $\text{CaAl}_2\text{O}_4\text{:Eu}^{2+}$ , $\text{Nd}^{3+}$ and/or $\text{Dy}^{3+}$ .

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It is evident that the  $\text{Eu}^{2+}$

$\text{Eu}^{2+}$  ion acts as a luminescent centre emitting in the blue ( $\lambda_{\text{max}} = 440 \text{ nm}$ ) spectral region for  $\text{CaAl}_2\text{O}_4\text{:Eu}^{2+}$ . The  $\text{R}^{3+}$  ion is believed to act as a trap or somehow modify the trap properties in these phosphors. Despite a large number of research on the phenomenon the mechanism of the persistent luminescence of the  $\text{CaAl}_2\text{O}_4\text{:Eu}^{2+}, \text{R}^{3+}$  materials has not been well presented. The theories that have so far been put forward are generally contradictory therefore much less agreement exists on the role of the  $\text{R}^{3+}$  co-dopant. New emerging applications for the long phosphorescent materials such as radiation detection and sensors for structural damage, fracture of materials and temperature, require the exact luminescence mechanisms and the identification of the trap levels/locations. Analysis of the thermoluminescence (TL) glow curves is one of the most significant ways to measure the number and also the activation energy of the trapping levels in these materials. In the present study the TL properties of the  $\text{Eu}^{2+}, \text{R}^{3+}$  doped  $\text{CaAl}_2\text{O}_4\text{:Eu}^{2+}, \text{Nd}^{3+}/\text{Dy}^{3+}$  were investigated above room temperature. The trap depths were estimated with the aid of the peak shape method. The glow curve of  $\text{CaAl}_2\text{O}_4\text{:Eu}^{2+}$  with a first peak at  $50^\circ\text{C}$  was found to correspond to several traps. The  $\text{Nd}^{3+}$  and  $\text{Dy}^{3+}$  ions were observed to greatly enhance the intensity of the high-temperature TL peaks and also form most of the traps suitable for intense and long-lasting persistent luminescence. The trap depths and the  $\text{R}^{3+}$  or  $\text{R}^{2+}$  level positions did not exhibit any well defined relationship. The traps may thus involve more complex mechanisms than the simple charge transfer to (or from) the  $\text{R}^{3+}$  ions.

Level (Hons, MSc, **PhD**, other)?

M.Sc

Consider for a student **award** (Yes / No)?

Yes

Would you like to **submit a short paper** for the Conference **Proceedings** (Yes / No)?

Yes

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**Session Classification:** Poster1

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