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Thermoluminescence Study of Long Persistent CaAl<sub>2</sub >O₄:Eu²⁺, Nd³⁺ and/or Dy³⁺.

Wednesday, 13 July 2011 17:00 (2 hours)

<p>It is evident that the Eu<sup>

2+</sup> ion acts as a luminescent centre emitting in the blue (λmax 440 nm) spectral region for CaAl₂O₄:Eu<s
The R³⁺ 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 CaAl₂O4:Eu²⁺,R³⁺ 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 R³⁺ 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 Eu²⁺, R³⁺ doped CaAl₂O₄:Eu²⁺, Nd³⁺/Dy³⁺ were investigated above room temperature. The trap depths were estimated with the aid of the peak shape method. The glow curve of CaAl₂O₄:Eu²⁺ with a first peak at 50 ℃ was found to correspond to several traps. The Nd³⁺ and Dy³⁺ 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 R³⁺ or R²⁺ 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 R³⁺ 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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