



Contribution ID: 255

Type: Oral Presentation

## Effect of $\text{Eu}^{3+}$ concentration on the $\text{BaAl}_2\text{O}_4/\text{CaAl}_4\text{O}_7:x\% \text{Eu}^{3+}$ ( $0 \leq x \leq 5.5$ ) mixed phases nanophosphors synthesized using citrate sol-gel method.

Monday, 26 July 2021 12:45 (15 minutes)

A series of undoped mixed phase  $\text{BaAl}_2\text{O}_4/\text{CaAl}_4\text{O}_7$  (hereafter called BC) and doped  $\text{BC}:x\% \text{Eu}^{3+}$  ( $0 < x \leq 5.5$ ) mixed phases nanophosphors were successfully prepared by the citrate sol-gel technique. The structure, morphology and optical properties of the nanophosphors were studied in details by the X-ray diffraction (XRD), Scanning electron microscopy (SEM), Transmission electron microscopy (TEM) and Photoluminescence (PL) spectroscopy. XRD and SEM showed that all the  $\text{BC}:x\% \text{Eu}^{3+}$  samples consists of the crystalline structure of the mixed phases of both the  $\text{BaAl}_2\text{O}_4$  and  $\text{CaAl}_4\text{O}_7$  materials. The structure resembles more of the  $\text{BaAl}_2\text{O}_4$  than the  $\text{CaAl}_4\text{O}_7$  phase. The TEM results suggest that crystallite sizes are in the nanometer scale with rods-like particles. PL results showed multiple emission peaks located at 436, 590, 616, 656 and 703 nm, which were assigned to the intrinsic defects within the BC matrix,  $5\text{D}_0 \rightarrow 7\text{F}_1$ ,  $5\text{D}_0 \rightarrow 7\text{F}_2$ ,  $5\text{D}_0 \rightarrow 7\text{F}_3$  and  $5\text{D}_0 \rightarrow 7\text{F}_4$  transitions of  $\text{Eu}^{3+}$ , respectively. The decay curves evidently showed that the nanophosphors have persistent luminescence. The Commission International de l'Eclairage (CIE) analysis revealed that BC emits a blue colour while the  $\text{Eu}^{3+}$ -doped BC phosphors emit in the orange-red region. The results indicate that the  $\text{Eu}^{3+}$ -doped samples can potentially be used in the orange/red-emitting phosphors.

**Apply to be considered for a student ; award (Yes / No)?**

Yes

**Level for award;(Hons, MSc, PhD, N/A)?**

PhD

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**Session Classification:** Physics of Condensed Matter and Materials

**Track Classification:** Track A - Physics of Condensed Matter and Materials