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Synthesis and Characterization of $\text{CaAl}_2\text{O}_4\text{:Tb}^{3+}$ Phosphor using Solution – Combustion Method.

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Presently $\text{CaAl}_x\text{O}_y\text{:Tb}$ green phosphors are mainly prepared by the solid-state process which is more feasible than others in terms of operation and large-scale production. However, the raw materials are usually not mixed well and very high temperature is needed to synthesize the final powder using the solid-state process. In order to solve these problems, Terbium ion doped calcium aluminate ($\text{CaAl}_x\text{O}_y\text{:Tb}^{3+}$)

Tb^{3+} green phosphors were obtained at low temperatures (500°C) by the solution - combustion of corresponding metal nitrate-urea solution mixtures, over a time of 5 min. The morphology and structural properties were characterized by scanning electron microscopy (SEM) and X-ray diffraction (XRD), SEM shows that the particles are irregular shape and are aggregated and the structural analysis revealed the presence of monoclinic CaAl_4O_7 at optimized fuel to nitrate molar ratio. The characteristic luminescence properties were investigated using emission spectra. It was found that the oxidizer: fuel molar ratios showed greatly influence not only on morphology, but also on their PL spectra. The photoluminescence (PL) excitation spectrum was characterized by a dominant broad band centered on 239 nm. Intense emission bands were observed at 489 nm, 544 nm, 587 nm and 622 nm originating from the $^5\text{D}_4$ to $^7\text{F}_J$ transition and other bands were observed at 379, 417 and 438nm originating from $^5\text{D}_3$ to $^7\text{F}_J$ transition, which correspond to the crystal field splitting components of the Tb^{3+} 4f states in CaAl_4O_7 . The effects of doping concentration of Tb^{3+} on luminescence lifetimes and intensities were also investigated. The samples with Tb concentration of 1.0 mole

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

Msc

**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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