



Contribution ID: 322

Type: Poster Presentation

The effect of Sm³⁺ concentration on the structure, morphology and photoluminescence properties of co-doped CaAl₂O₄:0.1%Tb³⁺, x%Sm³⁺ ($0 \leq x \leq 2$) nanophosphor prepared by the citrate sol gel technique.

CaAl₂O₄:0.1%Tb³⁺, x% Sm³⁺ ($0 < x < 2$) nano-powders have been successfully prepared via sol-gel technique. Annealing temperature and time were kept constant at 900 °C and 2 hours (h), respectively for all samples. X-ray diffraction (XRD) analysis showed that all powder samples have a monoclinic structure without any impurities. Energy dispersive X-ray spectroscopy (EDS) results confirmed the presence of all expected elements and the EDS map showed that the elements were distributed homogeneously on the surface. Scanning electron microscopy (SEM) results revealed that the prepared powder morphology was influenced by doping. The ultraviolet-visible (UV-vis) spectra showed that doping with Tb³⁺ and varying the Sm³⁺ concentration influenced the effective band gap (E_g) of the host material. The photoluminescence (PL) results showed the emissions peaks at 430, 485, 548 and 601 nm attributed to the intrinsic defects within the host. The Tb³⁺ doped samples showed four emission peaks at 485, 546, 585 and 620 nm attributed to 5D₄→7F₃, 5D₄→7F₄, 5D₄→7F₅ and 5D₄→7F₆ transitions of Tb³⁺, respectively. The Sm³⁺ doped samples showed three emission peaks centered at 562, 600 and 647 nm attributed to 4G_{5/2}→6H_{5/2}, 4G_{5/2}→6H_{7/2}, 4G_{5/2}→6H_{9/2} transitions of Sm³⁺, respectively.

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

No

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

N/A

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Session Classification: Physics of Condensed Matter and Materials

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