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Analysis of varying Tb³⁺ concentrations on the structural and optical properties of mixed phases of CaAl₂O₄/Ca_{1.02}Sr_{1.98}Al₂O₄/SrAl₂O₄/SrO/Al₂O₃:x%Tb³⁺ (0 ≤ x ≤ 2) prepared by sol-gel method.

Thursday, 29 July 2021 12:00 (15 minutes)

Mixed phases of Tb³⁺ doped CaAl₂O₄/Ca_{1.02}Sr_{1.98}Al₂O₄/SrAl₂O₄/SrO/Al₂O₃ (CCSSA:x%Tb³⁺ (0 ≤ x ≤ 2)) nanophosphors were successfully prepared using sol-gel method. X-ray diffraction (XRD) patterns revealed that all the annealed samples resembled the mixed phases of monoclinic (CaAl₂O₄ and SrAl₂O₄), cubic (Ca_{1.02}Sr_{1.98}Al₂O₄ and SrO) and hexagonal (Al₂O₃) crystal structures, which were not influenced by variation the Tb³⁺ concentration. Scanning electron microscopy (SEM) images showed that the morphological features of the prepared nanophosphors were influenced by the Tb³⁺ concentration. Transmission electron microscopy (TEM) confirmed that the prepared materials were on the nanoscale region. Ultraviolet-visible (UV-vis) diffuse reflection spectroscopy showed that the band gap energy can be tuned in the range 4.90- 5.35 eV. Photoluminescence (PL) results showed four emission peaks located at around 490, 544, 583 and 622 nm and they were respectively ascribed to 5D₄ → 7F₆, 5D₄ → 7F₅, 5D₄ → 7F₄ and 5D₄ → 7F₃ transitions of Tb³⁺ ions.

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

Yes

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

MSc

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