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Effect of Eu3+ concentration on the BaAl2O4/CaAl4O7:x% Eu3+ (0 ≤ x ≤ 5.5) mixed phases nanophosphors synthesized using citrate sol-gel method.

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A series of undoped mixed phase BaAl2O4/CaAl4O7 (hereafter called BC) and doped BC:x% Eu3+ (0 < x ≤ 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 BC:x% Eu3+ samples consists of the crystalline structure of the mixed phases of both the BaAl2O4 and CaAl4O7 materials. The structure resembles more of the BaAl2O4 than the CaAl4O7 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, 5D0 ⟶ 7F1, 5D0 ⟶ 7F2, 5D0 ⟶ 7F3 and 5D0 ⟶ 7F4 transitions of Eu3+, 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 Eu3+-doped BC phosphors emit in the orange-red region. The results indicate that the Eu3+-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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