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White-light emitting BaAl2O4/CaAl4O7:x% Dy3+ (0 ≤ x ≤ 3) mixed phase nanophosphors synthesized using citrate sol-gel method.

Light emitting un-doped mixed phase BaAl2O4/CaAl4O7 (here after named BC) and BC: x% Dy3+ (0 < x ≤ 3) nanophosphors were prepared using citrate sol-gel method. Their morphology and photoluminescence (PL) properties were studied by X-ray Diffraction (XRD), Scanning electron microscope (SEM), Transmission electron microscope (TEM) and Commission international de l'éclairage (CIE). XRD and SEM analysis revealed that the BC nanophosphors had both monoclinic and hexagonal structures. SEM unveiled nanostructures consisting of nanorods, which have been grown during the preparation. TEM confirmed the SEM results and further showed that crystallite sizes were in the nanoscale order. The PL increased when x% Dy3+ (0 < x ≤ 0.6) was increased. The optimum concentration was found to be 0.6% Dy3+, after which, the PL decreased due to concentration quenching. The emission peaks are located at 436, 477 and 571 nm corresponding to the defects within the intrinsic bandgap, 4F9/2 ⟶ 6H15/2 and 4F9/2 ⟶ 6H13/2 transitions of Dy3+, respectively. The CIE coordinates revealed that BC emits in the blue region while the Dy3+-doped BC nanophosphors emit in the white region. The results showed that a white-light LED can be produced with the nanophosphors.

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

Yes

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

PhD

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