Particle size, morphology and color tunable ZnO: Eu^{3+}nanophosphors via plant latex mediated green combustion synthesis

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Abstract

Efficient ZnO:Eu^{3+} (1–11 mol%) nanophosphors were prepared for the first time by green synthesis route using *Euphorbia tirucalli* plant latex. The final products were well characterized by powder X-ray diffraction (PXRD), scanning electron microscopy (SEM), transmission electron microscopy (TEM), UV–visible spectroscopy (UV–Vis), Fourier transform infrared spectroscopy (FTIR), etc. The average particle size of ZnO:Eu^{3+} (7 mol%) was found to be in the range 27–47 nm. With increase of plant latex, the particle size was reduced and porous structure was converted to spherical shaped particles. Photoluminescence (PL) spectra indicated that the peaks situated at ~590, 615, 648 and 702 nm were attributed to the $^5D_0 \rightarrow {}^7F_{j(j=1,\,2,\,3,\,4)}$ transitions of Eu^{3+} ions. The highest PL intensity was recorded for 7 mol% with Eu^{3+} ions and 26 ml plant latex concentration. The PL intensity increases with increase of plant latex concentration up to 30 ml and there after it decreases. The phosphor prepared by this method show spherical shaped particles, excellent chromaticity co-ordinates in the white light region which was highly useful for WLED's. Further, present method was reliable, environmentally friendly and alternative to economical routes.

Keywords

Plant latex, Nanophosphor, Green synthesis, Rietveld refinement, Photoluminescence, Color coordinates