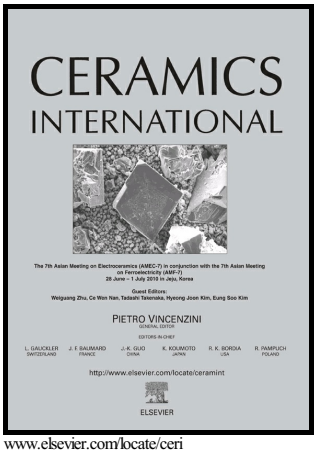

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Tunable single-phased white-emitting $Sr_3Y(PO_4)_3:Dy^{3+}$ phosphors for near-ultraviolet white light-emitting diodes

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Abstract

Single-component white-emitting $Sr_3Y(PO_4)_3:Dy^{3+}$ phosphors were synthesized by a high-energy deformation process. X-ray diffraction patterns showed the resulting crystallized phase to be of cubic structure, space group I-43d (no. 220). The broad-band excitation spectra between 250 and 500 nm were observed by monitoring the emission wavelength at 576 nm, which matches well with commercial near-UV or blue LED chips. Under a 352 nm excitation, the emission peaks were observed at 483 nm (blue), 576 nm (yellow), and 666 nm (red), corresponding to the $^4F_{9/2} \rightarrow {}^6H_{15/2}$, $^4F_{9/2} \rightarrow {}^6H_{13/2}$, and $^4F_{9/2} \rightarrow {}^6H_{11/2}$ transitions of Dy^{3+} ions. The optimized doping concentration of Dy^{3+} ion was 8 mol%. By controlling the Dy^{3+} ion concentration, tunable colors from white to yellow were obtained in $Sr_3Y(PO_4)_3:Dy^{3+}$ phosphors. These results reveal that studied materials may be a promising candidate for white LED applications.

Keywords: $Sr_3Y(PO_4)_3$; Dy^{3+}; Luminescence; White LED; Phosphors