

Visible and NIR steady state luminescence properties of Dy³⁺-doped calcium phosphate glasses for light emitting diodes

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Abstract

This study reports the fabrication and photoluminescence characteristics of CaO modified Dy³⁺-doped phosphate glasses under the influence of Ca/P ratio for tuneable light emission. Dysprosium (Dy³⁺)-doped calcium phosphate (CaPDy) glasses were fabricated by melt-quenching technique and investigated their luminescence characteristics. Photoluminescence excitation spectrum has revealed an intense band at 349 nm which is used for extracting the luminescence characteristics. Under 349 nm excitation, the emission spectra unveiled an intense emission at 573 nm in the visible region and 1011 nm in the near-infrared regions. The decay curves of the several emissions (484, 573, 1011 and 1178 nm) transitions were obtained and analysed using non-exponential function. Yellow-to-blue ratios and chromaticity coordinates were evaluated from the emission spectra and utilised to evaluate the color-correlated temperature. With the sum of results, these glasses, especially 30CaPDy glass, could be a potential candidate for yellowish white solid-state laser and light emitting diode applications.