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Enhanced photoluminescence emission from Dy³⁺ and Tb³⁺ activated lanthanum phosphovanadate

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Abstract content (Max 300 words) Formatting & Special chars

Dysprosium and terbium doped lanthanum phosphovanadate ($\text{La}_{0.25}\text{P}_{0.75}\text{O}_4$) Dy³⁺ and Tb³⁺ phosphor powders were synthesized by the solution combustion method. X-ray diffraction (XRD) was used to investigate phase formation of the prepared phosphor powder. Scanning electron microscopy (SEM) images revealed that the prepared powder consisted of different shapes and sizes. Elemental composition was examined by energy dispersive x-ray spectroscopy (EDS), while the stretching mode frequencies were determined by Fourier transform infrared spectroscopy (FTIR). The band gap was estimated from the diffuse reflectance spectra. The excitation spectra of both dysprosium and terbium doped samples showed a strong broad band extending from 200 to 350 nm with the maximum at $\lambda \approx 274$ nm. Photoluminescence emission spectra for dysprosium doped samples showed two peaks at 480 nm (${}^4\text{F}_{9/2} \rightarrow {}^6\text{H}_{13/2}$) and 573 nm (${}^4\text{F}_{9/2} \rightarrow {}^6\text{H}_{15/2}$) corresponding to Dy³⁺ emission while four emission peaks were observed for terbium doped samples at 490 nm (${}^5\text{D}_2 \rightarrow {}^7\text{F}_5$), 544 nm (${}^5\text{D}_2 \rightarrow {}^7\text{F}_5$), 586 nm (${}^5\text{D}_2 \rightarrow {}^7\text{F}_2$) and 623 nm (${}^5\text{D}_2 \rightarrow {}^7\text{F}_5$) corresponding to transitions of Tb³⁺ ions. These photoluminescence results further revealed that the PL intensity increases with an increase in temperature.

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

N/A

Main supervisor (name and email) and his / her institution

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