

## Dependence of photoluminescence (PL) emission intensity on $\text{Eu}^{3+}$ and ZnO concentrations in $\text{Y}_2\text{O}_3:\text{Eu}^{3+}$ and $\text{ZnO}\cdot\text{Y}_2\text{O}_3:\text{Eu}^{3+}$ nanophosphors

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### ABSTRACT

$\text{Y}_2\text{O}_3:\text{Eu}^{3+}$  and  $\text{ZnO}\cdot\text{Y}_2\text{O}_3:\text{Eu}^{3+}$  nanophosphor powders with different concentrations of  $\text{Eu}^{3+}$  ions were synthesized by a sol–gel method and their luminescence properties were investigated. The red photoluminescence (PL) from  $\text{Eu}^{3+}$  ions with the main emission peak at 612 nm was observed to increase with  $\text{Eu}^{3+}$  concentration from 0.25 to 0.75 mol% and decreased notably when the concentration was increased to 1 mol%. The decrease in the PL intensity at higher  $\text{Eu}^{3+}$  concentrations can be associated with concentration quenching effects. The red emission at 612 nm was shown to increase considerably when ZnO nanoparticles were incorporated in  $\text{Y}_2\text{O}_3:\text{Eu}^{3+}$  while green emission from ZnO was suppressed. The increase is attributed to energy transfer from ZnO to  $\text{Eu}^{3+}$ .