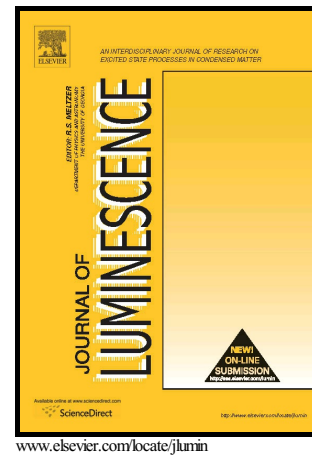


# Author's Accepted Manuscript

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# Exploring the ${}^4I_{13/2} \rightarrow {}^4I_{15/2}$ radiative transition from $\text{Er}^{3+}$ in $\text{Y}_2\text{O}_3$ for temperature sensing

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## ABSTRACT

The influence of temperature on the near-infrared emission band corresponding to the radiative relaxation from  ${}^4I_{13/2}$  to  ${}^4I_{15/2}$  electronic states of  $\text{Er}^{3+}$  was investigated in  $\text{Y}_2\text{O}_3$  powder prepared by combustion synthesis. We observed that the electronic population distribution among various Stark levels of  ${}^4I_{13/2}$  and  ${}^4I_{15/2}$  changes with temperature in way that is favorable for temperature sensing based on the luminescence intensity ratio technique. We also observed that the absolute temperature sensitivity varies by around 300 % depending on the Stark transitions of choice with the highest relative temperature sensitivity value being around  $2 \times 10^{-3} \text{ K}^{-1}$  at room temperature. Optically induced heat was found to be negligible under our experimental conditions.

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