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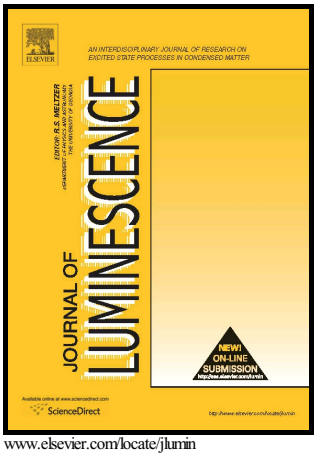

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Exploring the $^4I_{13/2} \rightarrow {}^4I_{15/2}$ radiative transition from Er^{3+} in Y_2O_3 for temperature sensing

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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 Er^{3+} was investigated in Y_2O_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 2×10^{-3} K^{-1} at room temperature. Optically induced heat was found to be negligible under our experimental conditions.

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