

# Temperature luminescence properties of $\text{Eu}^{3+}$ -doped $\text{Gd}_2\text{O}_3$ phosphors

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## Abstract

Rare earth (RE) oxides are important hosts for the luminescence of RE activators with numerous practical applications in light-emitting devices. In this work, we investigated the possibility for  $\text{Gd}_2\text{O}_3:\text{Eu}^{3+}$  usage in phosphor thermometry by observing the temperature changes of trivalent europium ion transitions from the  $^5\text{D}_0$  and  $^5\text{D}_1$  energy levels to the ground-state levels. A set of three samples of  $\text{Eu}^{3+}$ -doped  $\text{Gd}_2\text{O}_3$  (1, 5 and 10 at.%  $\text{Eu}^{3+}$ ) was produced via combustion synthesis. The sample crystalline structure is confirmed by XRD measurements. The intensity ratio of the two emission lines was studied as a function of temperature in the temperature range 300–800 K, and lifetime was measured in the interval 10–800 K. All three  $\text{Gd}_2\text{O}_3:\text{Eu}^{3+}$  samples proved to have good potential for the development of thermographic phosphors.

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(Some figures may appear in color only in the online journal)