

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 Gd₂O₃:Eu³⁺ usage in phosphor thermometry by observing the temperature changes of trivalent europium ion transitions from the 5D₀ and 5D₁ energy levels to the ground-state levels. A set of three samples of Eu³⁺-doped Gd₂O₃ (1, 5 and 10 at.% Eu³⁺) 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 Gd₂O₃:Eu³⁺ samples proved to have good potential for the development of thermographic phosphors.