The possibility of using Sm3+- and Dy3+-doped Gd2O3 nanopowders as thermographic phosphor materials was studied. Both samples were synthesized by a combustion method. The crystalline structure of synthesized samples was confirmed by x-ray diffraction measurements.

Photoluminescence measurements were recorded in the temperature range from 298 to 773 K. The photoluminescence spectrum of Sm3+ showed peaks that originate from 4G5/2!6HJ transitions, while in the case of Dy3+ 4F7/2!6HJ transitions were observed. The fluorescence intensity ratio of the prepared nanomaterials was studied as a function of temperature using the 4G5/2!6H5/2 and 4G5/2!6H7/2 transitions of Sm3+ ions and the 4F7/2!6H13/2 and 4F7/2!6H15/2 transitions of Dy3+ ions. Both doped Gd2O3 samples proved to have good potential for the development of thermographic phosphors. The maximum sensitivity was approximately 1.744×10–3 K−1 for the sample with 1 mol% Sm3+

at 701K and 2.48×10–3 K−1 for the sample with 1 mol% Dy3+ at 773 K. The lifetime measurements were recorded in the same temperature region for the 606 and 572 nm lines of samarium and dysprosium, respectively. The lifetime at room temperature was found to be

about 0.395 ms for Sm3+ and 0.123 ms for Dy3+ and it decreased as the temperature increased.