Synthesis and Spectroscopic Study of $Gd_2O_3:Eu^{3+}$ Nanophosphors by Benzenetricarboxylate Method

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The rare earth (RE) complexes of 1,3,5-benzenetricarboxylic acid (TMA) present favorable thermal properties to prepare oxides at low temperatures and were synthesize as reported in the literature [1]. The luminescent nanophosphors were obtained by annealing the complexes at 500, 600 and 700 ^{o}C.

The phosphors were characterized by X-ray powder diffraction, infrared absorption spectroscopy, refractometry, thermal analysis, scanning and transmission electron microscopy. The X-ray diffraction patterns showed the formation of the cubic phase of the Gd_2O_3 indicating the total decomposition of the organic phase during annealing. The increasing annealing temperature contributes to higher crystallinity (Figure 1). The crystallite sizes calculated using the Scherrer's equation grows (8 to 29 nm) with increasing anneling temperature (500 to 700 ^{o}C 1h) [2].

The luminescent properties were studied through the excitation and emission spectra and excited state lifetime. The splitting of the $^5D_0 \rightarrow {}^7F_0$ transition shows the presence more than one symmetry site. It is also observed a high intensity $^5D_0 \rightarrow {}^7F_2$ transition, indicating that at least one of the sites is not center-symmetric.

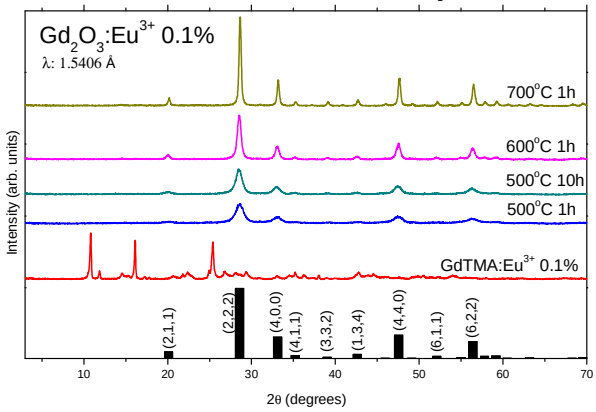

Figure 1: X-ray powder diffraction of the $Gd_2O_3:Eu^{3+}$ 0.1% annealed at different temperatures.

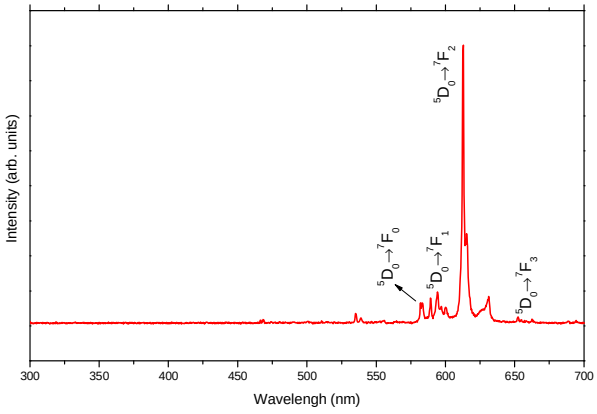

Figure 2: Emission spectrum of the $Gd_2O_3:Eu^{3+}$ 0.1% phosphor annealed at 500 °C under excitation of 260 nm.

Keywords: Nanomaterials, luminescence, europium, gadolinium, rare earths, phosphors.

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[1] E. R. Souza, I. G. N. Silva, E. E. S. Teotonio, M. C. F. C. Felinto, H. F. Brito, J. Lumin., **130**, 283 (2010).
[2] H. P. Klug, L. E. Alexander, X-ray Powder Diffraction Procedures, Wiley, New York (1959).

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