$Y_2O_2SO_4:Eu^{3+}$ Nanomaterials Synthesis by a Benzenecarboxylate Method

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Luminescent nanomaterials have been mainly investigated in recent years because of significant differences in structure and performance from the bulk [1,2]. Most preparation methods of nanosized luminophores need high temperatures or complicated experimental procedures. Rare earth (RE) 5-Sulfoisophthalic acid complexes ($RE(STMA)\cdot 4H_2O$) decompose to rare earth sulfates $RE_2O_2SO_4:Eu^{3+}$ in one step at low temperature, the compounds were annealed at 500, 600, 700, 800, 900 and 1000 °C [3]. This work reports a new low temperature preparation method of the $Y_2O_2SO_4:Eu^{3+}$ nanomaterials based on benzenecarboxylate method precursors.

TGA analyses (Fig. 1) show on event from 35 to 175 °C corresponding to the loss of 4 water molecules and only one decomposition event, from 490 to 670 °C (loss of organic moiety). The XRD confirms the obtainment of $Y_2O_2SO_4:Eu^{3+}$ materials without the presence of other phases up to 900 °C, after this temperature Rietveld refinement show formation of Y_2O_3.

The excitation spectra (Fig. 2) exhibit the LMCT O→Eu band centered at 275 nm and the intraconfigurational 4f transitions of Eu^{3+}. The excitation spectra show similar features independently of the annealing temperature, with the presence of an extra low intensity broad band in the compounds annealed at 500 and 600 °C, owing to oxycarbonated. The emission spectra (Fig. 3) exhibit only the intraconfigurational 4f transitions of the Eu^{3+} ion, with the presence of transitions arising from the ^5D_J (J: 0, 1 and 2).

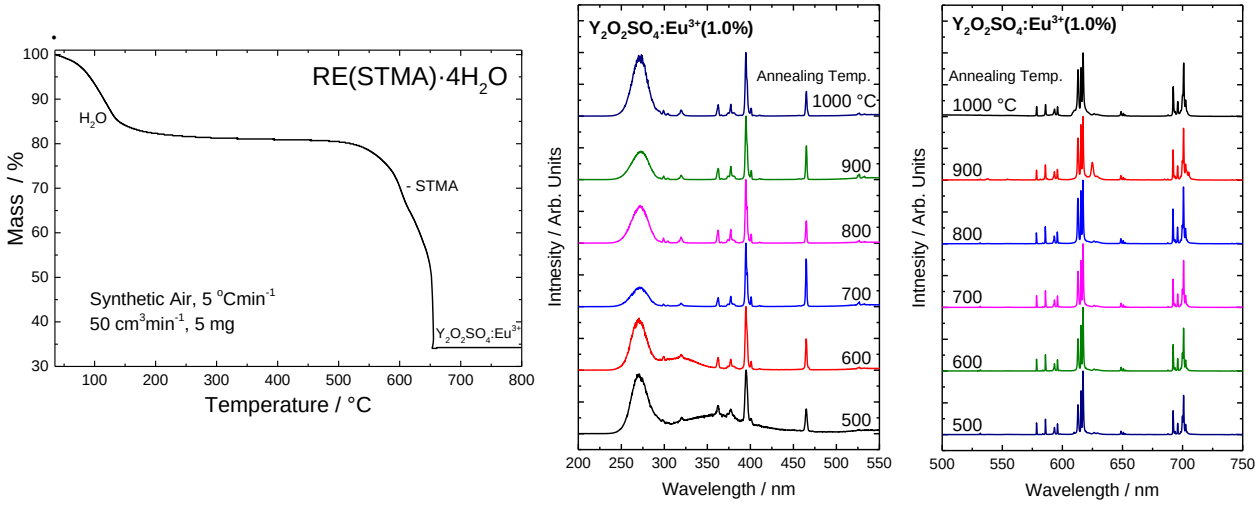

Fig. 1. Thermogravimetric analysis of Y(STMA):Eu^{3+}. **Fig. 2.** Excitation spectra of the $Y_2O_2SO_4:Eu^{3+}$(1.0%) materials, with emission monitored at 617 nm. **Fig. 3.** Emission spectra of the $Y_2O_2SO_4:Eu^{3+}$(1.0%) materials, with excitation at 275 nm.

[1] S.H. Shin, J.H. Kang, D.Y. Jeon and D.S. Zang, *J. Lumin.*, **2005**, 114, 275.
[2] M.K. Devaraju, S. Yin and T. Sato, *J. Cryst.. Growth*, **2009,** 311**,** 580.
[3] E.R. Souza, I.G.N. Silva, E.E.S. Teotônio, M.C.F.C. Felinto and H.F. Brito, J. Lumin., **2010**, 130, 283.

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