

Synthesis and Spectroscopic Study of YTMA:Eu³⁺

I.G.N. Silva¹, B. Andreoli¹, M.C.F.C. Felinto², H.F. Brito¹
¹*IQ, Universidade de São Paulo, Campus São Paulo, SP, Brazil*
²*CQMA, Instituto de Pesquisa Energéticas e Nucleares, SP, Brazil*

Rare earth ions (RE³⁺) have been widely used as emitters of visible light in various applications such as Organic Light-Emitting Diode (OLED), lasers, optical markers, displays etc. Luminescent complexes of RE³⁺ with 1,3,5-benzenetricarboxylate (TMA) have already been synthesized and showed applicability. These complexes with ions smaller than Gd³⁺ presented a non-hydrated character. This work studies the new non-hydrated europium-doped yttrium complexes with TMA, in order to investigate the photoluminescence properties of this series of anhydrous phosphors.

The complexes YTMA:Eu³⁺(x%) were synthesized as reported in literature [1] with different Eu³⁺ concentrations (x: 0.1, 0.5, 1.0 and 5.0 in mol% of Y³⁺). The phosphors were characterized by elemental analysis, X-ray powder diffraction, infrared absorption spectroscopy, refractometry, thermal analysis and scanning electron microscopy.

The synthesized complexes have crystalline character, and are isomorphous, independently of the Eu³⁺ concentration [2]. The scanning electron microscopy shows that the phosphorus form lamellar aggregates.

The luminescent properties were studied through the excitation, emission spectra and excited state lifetime. The absence of the ligand emission band in the spectrum shows excellent transfer of energy from ligand to Eu³⁺ excited state.

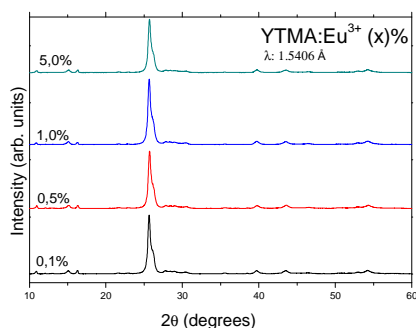


Fig. 1: X-rays diffraction patterns of YTMA:Eu³⁺ (x%)

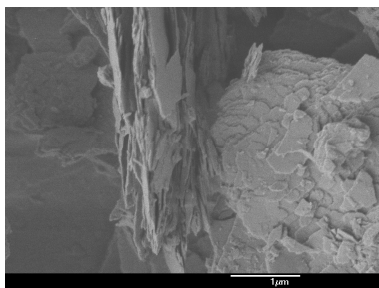


Fig. 2: SEM image of YTMA:Eu³⁺ 1%.

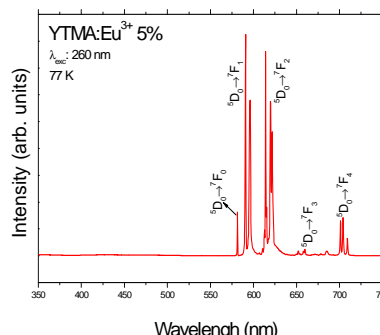


Fig 3: Emission spectrum of YTMA:Eu³⁺ 5%.

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

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ivan.guide.silva@usp.br - Instituto de Química da Universidade de São Paulo. Av. Prof. Lineu Prestes, 748, Bl. 8 inf. Sala 812. Cidade Universitária, São Paulo-SP.