

Synthesis and Characterization of Rare Earth Codoped BaGdF₅ Nanoparticles

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The present work intends to develop multifunctional luminescent probes (by upconversion emission) for biological label, imaging and as drug carrier for mRNAs. In this sense, the rare earth ions are crucial and present distinct properties to obtain multifunctional system. The upconversion process from the pair Yb³⁺/Tm³⁺ allows the absorption of low energy photons, in the near infrared (NIR) region, followed by emission of a high energy photon, visible or UV region. Codoped Nanoparticles of BaGdF₅:Yb³⁺:Tm³⁺, with variable rare earth concentrations, were carried out by hydrothermal synthesis¹ for 24 hours at 180 °C. The powder obtained was characterized by photoluminescence spectroscopy to determine the energy upconversion process and the number of photons involved, as Suyver et al.². E.g., for Yb³⁺/Tm³⁺ at 18/0,5 (%mol/mol), the number of photons were 2.84. The figure 1 presents the particles image obtained by TEM, with particles of around 30 nm that aggregated in a bigger spherical structure of 180 nm.

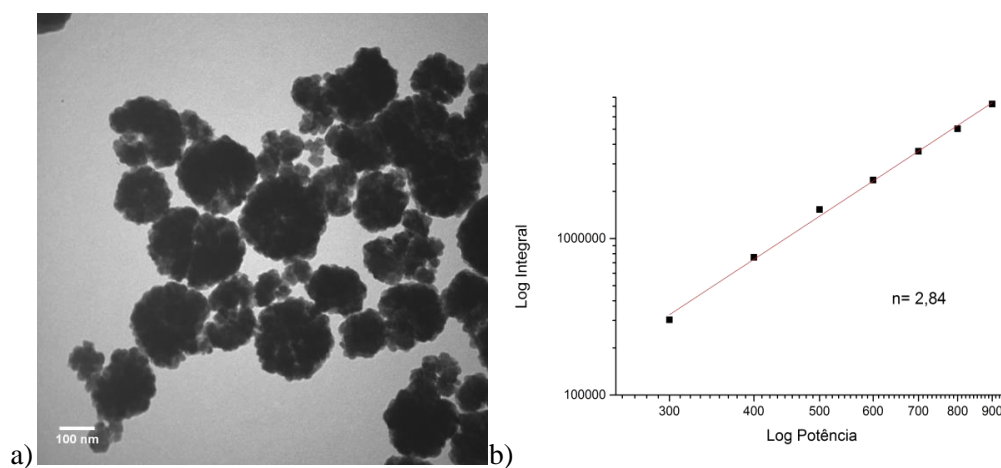


Figure 1. a) Transmission electronic microscopy of BaGdF₅:Yb³⁺:Tm³⁺. b) Logarithm function of emission (474 nm) intensity versus laser potency.

¹Guo, L.; Wang, Y.; Wang, Y.; Zhang, J.; Dong, P.; *CrystEngComm*, **2012**, *14*, 3131-3141.

² Suyver, J. F. et. al. *PhysicalReview B* **2005**, *71*, 1251231-1251239.