Área: INORGANICA (INO)

Influence of synthesis parameters on the upconversion luminescent properties of rare earth fluoride compounds

Nathalia P. Schoendorfer* (IC),[1] Andreza C. S. Silva (PQ),[1] Hermi F. Brito (PQ)[1]

***nathalia.schoendorfer@usp.br**

[1]*Departamento de Química Fundamental, Instituto de Química - USP;*

Palavras Chave: *Rare Earth Fluorides, Nanoparticles, Synthesis Parameters, Upconversion, Yttrium, Europium.*

Highlights

Using the coprecipitation method for the preparation of the yttrium fluoride matrix KY_2F_7 doped with the Eu^{3+} ion, it is possible to investigate whether changing certain synthesis parameters can influence the generation of the luminescence phenomenon by upconversion of luminescent nanoparticles.

Resumo/Abstract

Understanding the structural aspects and photoluminescent properties of nanoparticles using rare earth matrices is of great importance for application in various types of technological and biological systems, such as the use of color displays, biological imaging, optogenetics, nanophotonics, *etc*. Due to the spectroscopic characteristics with narrow excitation and mission bands and a long lifetime of the emitting states, presenting unique properties of these compounds. In this work, KY_2F_7:Eu^{3+} nanoparticles were prepared by the coprecipitation method, so the reaction was carried out in a round-bottom flask with three necks where KOH, KF, $Y(Ac)_3$ and 4% $Eu(Ac)_3$ (Ac: acetate) as a dopant are added in a medium with oleylamine, octadecene and oleic acid. The mixture is then heated under vacuum to 120 °C to remove all acetate and water solvent [1,2]. Therefore, the formation of nanoparticles occurs under a nitrogen atmosphere up to a temperature of 300ºC. In this study, it will be investigated whether the temperature change during the formation of nanoparticles is in fact a decisive parameter for the influence of the generation of the luminescence phenomenon by upconversion process and the nanomaterials obtained were characterized using XRD and electron microscopy techniques and the photonic properties were also studied [3].

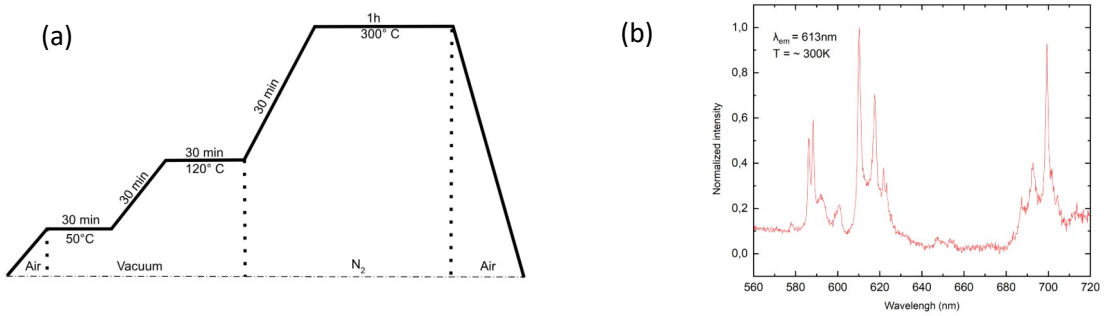

Figure 1: (a) Scheme of the synthesis of KY_2F_7:Eu^{3+} nanoparticles used with different temperatures, duration and parameters of each step, ramps, and plateaus and (b) Emission spectrum of the KY_2F_7:Eu^{3+} (4%) nanoparticles.

Agradecimentos/Acknowledgments

N. P. Schoendorfer is thankful to PUB for the “Iniciação Científica” grant. H.F. Brito is grateful to FAPESP thematic project 2021/08111-2 and CNPq for the 1A “Produtividade” fellowship (Grant 308872/2022-3).

References

[1] Pedraza, F. J.; Avalos, J. C.; Yust, B.G; Tsin, A.; Sardar, D. K. *Nanotechnology*, v. 27, n. 38, (2016).
[2] Wang, F., Deng, R. & Liu, X. Nat Protoc 9, 1634–1644 (2014).
[3] Silva A. C. S.- Tese de doutorado Instituto de Química - IQUSP, São Paulo-SP. (2023).