Submicron-crystals of $BaWO_4:Dy^{3+}$ and $SrWO_4:Dy^{3+}$ synthetized by green chemistry method

M. C.F.C. Felinto[1], E. Gaiollo[1], R. P. Moreira [1*], E. Bonturim[1], H. P. Barbosa[2], I. G.N. Silva[2], C.C.S. Pedroso[2], H. F. Brito[2], E. E. S, Teotonio[3], O. M. L. Malta[3,4]

[1]*Instituto de Pesquisas Energéticas e Nucleares, São Paulo-SP, Brazil,*
[2]*Universidade de São Paulo, Instituto de Química, São Paulo-SP, Brazil,*
[3]*Universidade Federal da Paraíba, Instituto de Química, João Pessoa-PB, Brazil,*
[4]*Universidade Federal de Pernambuco, Instituto de Química, João Pessoa-PB, Brazil.*
** Corresponding author: hefbrito@iq.usp.br*

Nowadays, the investigation of oxide based light emitting materials for white light-emitting diodes (w-LEDs) applications have generated interest due to the advantages such as long lifetime, low energy consumption, high luminescence efficiency and environmental friendliness [1]. These qualities make them a strong candidate for the solid state lighting, display devices, optoelectronic devices and light-emitting diodes (LEDs). In this work, we present results of Dy^{3+}: $BaWO_4$ and Dy^{3+}: $SrWO_4$ that present luminescence close to white color (Figure 1) left. They were synthetized using coprecipitation method. The emission spectra exhibit four emission transitions centered at around 486 nm, 576 nm, 665 nm and 760 nm corresponding to the transitions $^4F_{9/2}\rightarrow{}^6H_{15/2}$ (blue), $^4F_{9/2}\rightarrow{}^6H_{13/2}$ (yellow) $^4F_{9/2}\rightarrow{}^6H_{11/2}$ and $^4F_{9/2}\rightarrow{}^6H_{9/2}$ $^6F_{11/2}$ (red) respectively.Among these transitions $^4F_{9/2}\rightarrow{}^6H_{15/2}$ and $^4F_{9/2}\rightarrow{}^6H_{13/2}$ are observed to be strong whereas $^4F_{9/2}\rightarrow{}^6H_{11/2}$ transition is found to be relatively quite weak.The $^4F_{9/2}\rightarrow{}^6H_{13/2}$ transition is hypersensitive in nature and is strongly influenced by the environment around the Dy^{3+} ion site. It is observed in the luminescence spectra of these materials that the electric dipole transition is dominant compared to the magnetic dipole transition. The CIE diagram show emission close to white (Fig.1 right) for the five composition with little distortion of the color showing the influence of dopant concentration in the color of the emission.

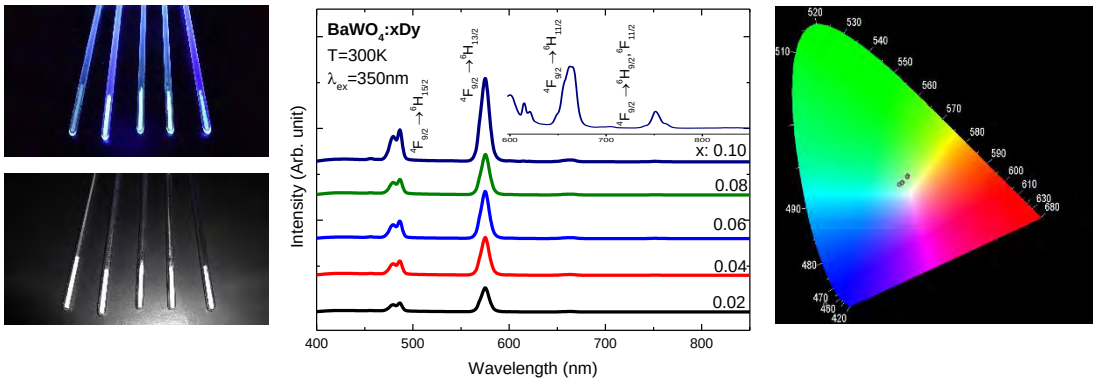

Figure1. Dy^{3+}: $BaWO_4$ under UV excitation (366nm) left, emission spectra under excitation at 350nm middle and chromaticity coordination diagram of $BaWO_4:Dy^{3+}$ material.

Keywords: Dysprosium luminescence, Tungstate, white light.

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References

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