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Luminescent $BaMoO_4:Eu^{3+}$ thin films

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Abstract – The synthesis of luminescent $BaMoO_4:Eu^{3+}$ thin films by Complex Polymerization Method (CPM). The studied of the morphology and optical properties of the thin films were the objectives in this work. These films were submitted to the thermal treatment from 300 to 900°C for 2 h. The scheelite-type crystalline structure was confirmed by X-ray diffraction (XRD) and Fourier transformed infrared (FTIR) spectroscopy. The results obtained suggest that both the morphology and photoluminescent property (PL) were dependents of the history of heat-treatment.

The films of molybdates, including the doped with earth rare, can be to have one wide variety of applications in electronics, optics, ionics and anticorrosion coatings and yours preparations have been great interest.[1,2] The exploration of synthesis of molybdates thin films is poor and rare, where the synthesis method most cited is the electrochemical.[3-4] $BaMoO_4$ films obtained by electrochemical method presented surface heterogeneous and high grain size, varying from 2 to 10 µm. There are any works in the literature about thin films of Eu^{3+} doped in $BaMoO_4$. The polymeric resin $BaMoO_4:Eu^{3+}$ was prepared by CPM and deposited onto Si substrates. The thin films obtained were heat treated in a resistive furnace in the temperature range of 300 to 900 °C, for 2h. In order to study the structural and optical properties and the morphology, these films were characterized by XRD, FTIR, Atomic Force Microscopy (AFM), Field–Emission Scanning Electron Microscopy (FEG-SEM) and photoluminescence spectroscopy. Figure 1 shows the diffraction peak (112) (100% peak), indicating uniquely the crystalline scheelite-type phase, according to JCPDS data base n° 29-0193 and confirmed by FTIR. Figure 2 illustrates PL spectra recorded at room temperature for $BaMoO_4:Eu^{3+}$ thin films heat-treated among 300 °C and 900 °C, using band emission wavelength around 350.7 nm. The PL intensity is linked to the thermal treatment history, therefore, to the crystalline structure. The morphologic structure showed to be free of crack, different and homogeneous for all films obtained. The results obtained suggest that both the morphology of thin films and PL properties were dependents of the history of heat-treatment.

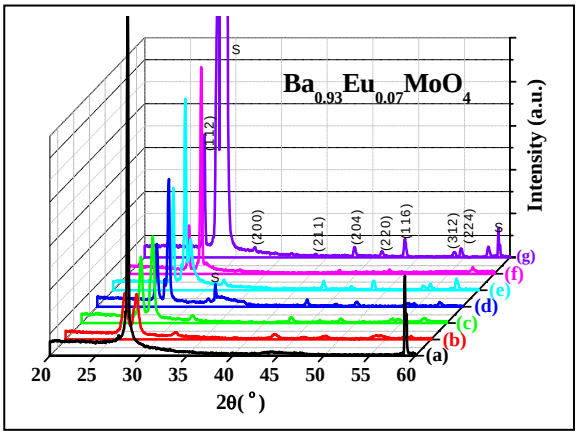

Figure 1: X-ray diffraction patterns of the $BaMoO_4:Eu^{3+}$ thin films heat-treated at: (a)300 °C; (b)400 °C; (c)500 °C; (d)600 °C; (e)700 °C; (f)800 °C and (g)900 °C

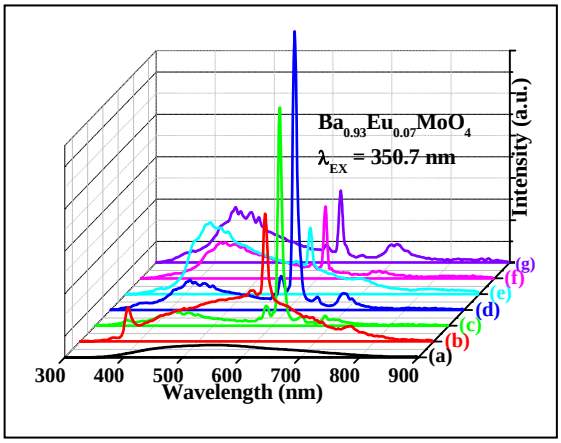

Figure 2: Emission spectra of the $BaMoO_4:Eu^{3+}$ thin films heat-treated at: (a)300 °C; (b)400 °C; (c)500 °C; (d)600 °C; (e)700 °C; (f)800 °C and (g)900 °C. $\lambda_{Exc.}$= 350.7 nm

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References

[1] A. P. A. Marques, D. M. A. de Melo, E. Longo, C. A. Paskocimas, P. S. Pizani and E. R. Leite, J. Solid State Chem. 178, 7 (2005) 2346 - 2353.
[2] A. P. A. Marques, E. R. Leite, J. A. Varela and E. Longo, Nanoscale Res Lett 3 (2008)152–157.
[3] M. Yoshimura, M. Ohmura, W. S. Cho, M. Yashima and M. Kakihana, J. Am. Ceram. Soc. 80, 9 (1997) 2464-2466.
[4] C. T. Xia and V. M. Fuenzalida, J. Europ. Ceram. Soc. 23 3 (2003) 519-525.