

Eu³⁺-doped BaMoO₄ (M: W or Mo) luminescent materials for lighting applications prepared by coprecipitation method

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This work presents the development and investigation of the structural, spectroscopic, and electronic properties of Eu³⁺-doped BaMoO₄ (M: W or Mo) compounds obtained by the coprecipitation method, at room temperature, targeting applications in phosphor-converted Light-Emitting Diode (pc-LEDs) lighting devices [1,2]. A systematic study was performed to determine optimal doping concentrations in order to obtain high-intensity monochromatic-like luminescence with efficient lanthanide quantum yield for red light emission. Structural analysis by X-Ray Powder Diffraction showed a stable characteristic scheelite-type structure for all of the studied compounds, with no phase segregation, as confirmed by Rietveld Refinement, whereas average crystallite size was estimated to be about 30 nm. Morphology and elemental distribution were probed by Scanning Electron Microscopy coupled with Energy dispersive X-ray spectroscopy, where homogeneous europium distribution was identified even at high doping concentrations (up to 10% molar). The optical behavior of the prepared materials was studied by Diffuse Reflectance Spectroscopy and Luminescence Spectroscopy in the UV-Vis range, displaying characteristic red emission, together with the nephelauxetic effect associated with spectral red-shifts attributed to structural distortions around the Eu³⁺ ion and significant (LMCT) contribution. The intensity parameters $\Omega_{2,4}$ and lanthanide quantum yield Q^{Ln}_{Ln} of all Eu-doped materials were also determined. Furthermore, the CIE color diagram was investigated, showing the rate of greenish-blue host matrix contribution ($[WO_4]^{2-}$ or $[MoO_4]^{2-}$) and Eu³⁺ luminescence in different compounds.

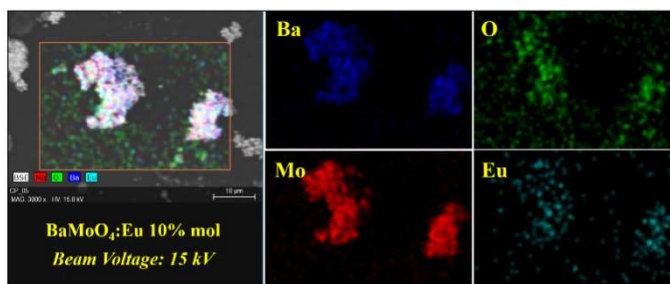
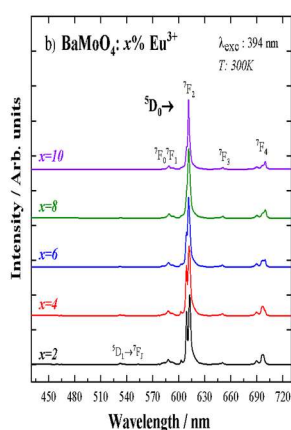


Fig.1: EDS elemental mapping images for BaMoO₄:Eu 10% acquired under 15 kV(a) and Emission spectra of the BaMoO₄:Eu x% mol under 394nm excitation.

[1] [A. M. Kaczmarek](#) and [R. V. Deun](#), *Chem. Soc. Rev.*, 2013,42, 8835-8848

[2] H.P.Barbosa et al, *J. Alloys Compd.*, 2017, 696,820-827