Structural and Optical Properties of Nd^{3+}-Doped BaMO4 (M: W, Mo) Phosphors Synthed by Coprecipitation Method

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Recently, rare-earth-doped molybdate and tungstate materials have gained interest due to their optical and electronic properties, making them promising for photonic and optoelectronic applications [1]. In this work, $BaMO_4$:x%Nd^{3+} (M=W, Mo) phosphors with Nd^{3+} (2.0–10 mol%) were synthesized via the coprecipitation method at room temperature. X-ray diffraction (XRD) confirmed the formation of a stable scheelite-type crystalline structure without phase segregation. Rietveld refinement validated phase purity and estimated an average crystallite size of 30 nm. The optical properties were analyzed using diffuse reflectance UV-Vis and Raman spectroscopy. Increasing Nd^{3+} concentration enhanced absorption in the near-infrared region. Raman spectra confirmed the stability of the scheelite lattice and suggested strong interactions between Nd^{3+} ions and the host matrix, influencing local crystal field effects [2]. Luminescence studies revealed characteristic Nd^{3+} emissions in the near-infrared, highlighting their potential for laser and optical amplification applications. Structural and optical analyses provided insights into the energy transfer mechanisms within the $BaMO_4$:Nd^{3+} matrix [3]. These results demonstrate the suitability of Nd^{3+}-doped $BaMO_4$ phosphors for photonic technologies, including solid-state lasers, infrared emitters, and energy conversion systems.

Acknowledgements
FAPESP (Grant 2021/08111-2), CAPES, CNPq, and IPEN-CNEN.

References

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