SYNTHESIS, CHARACTERIZATION AND SPECTROSCOPIC PROPERTIES OF NANOSIZE $Eu_2(MoO_4)_3$ AND $Eu^{3+}:Y_2(MoO_4)_3$

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The rare earth molybdates are an important family of inorganic materials which have many potential applications, such as phosphors, optical fibers and scintillators, magnet and catalysts. In this study it is showed the synthesis and characterization of $Eu_2(MoO_4)_3$ and $Eu^{3+}:Y_2(MoO_4)_3$ nanoparticles. These materials have potential to be used as biological markers.

The synthesis of $Eu_2(MoO_4)_3$ and $Eu^{3+}:Y_2(MoO_4)_3$ nanoparticles were done by precipitation method controlling the dispersion rate and were successful according to the structural characterization, elementary analysis, infrared absorption spectroscopy, and scanning electronic microscopy (SEM). All the experiments were done under similar conditions. The X-ray powder diffraction showed that $Eu_2(MoO_4)_3$ and $Eu^{3+}:Y_2(MoO_4)_3$ is crystalline and diffraction patterns correspond to the orthorhombic β- phase. The crystallite sizes were determined below to 25 nm.

The emission spectra show characteristic bands of Eu^{3+} emission belonging to the $^5D_0 \rightarrow {}^7F_J$ (J = 1- 4) 4f transitions. The emission spectrum of the $Eu_2(MoO_4)_3$ microarchitectures exhibits a single efficient red PL emission peak centered at around 616 nm, corresponding to the forced electric dipole transition ($^5D_0 \rightarrow {}^7F_2$), which is allowed in this case because the europium does not occupy a symmetry center in the matrix. The prepared phosphors exhibited pure and intense red emission at 616 nm under the excitation at 394 nm. Additionally, luminescent properties were correlated with the obtained structural and morphological features of the synthesized powders. Intensity parameters and quantum efficiency were calculated for these materials. High quality molybdate nanomaterials were successfully prepared with a simple one-step precipitation synthesis.

Figure Micrographs, X-ray powder diffraction patterns and emission spectra of $Eu_2(MoO_4)_3$