EUROPIUM BETHA-DIKETONATE COMPLEXES WITH TETRACYCLINE (TC)

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Luminescent materials containing trivalent rare earth (RE^{3+}) complexes with β-diketonate ligands have been intensively studied in recent years. The RE^{3+} compounds present characteristic narrow emission bands in the UV-Vis region, large Stokes shift and the antenna effect that enhance the overall quantum efficiency, As a result, these complexes have found wide applications as luminescent markers, photoluminescent sensors, electroluminescent devices, and multicolor display. In this work it was synthesized four new complexes of europium β-diketonate with tetracycline as ligand. IR spectra of the Eu(III) complexes show two strong absorption bands at ~1597 and ~1566 cm^{-1} attributed to ν_s(C=O) and ν_{as}(C=O) vibrational stretching modes, suggesting that the β-diketonate ligand acts as chelate ligand. SEM image showed particles rounded with grain size lower than 10 nm (Fig 1). The emission spectrum of europium complexes, in the solid state, recorded in the range of 420 to 720 nm at liquid nitrogen temperature, under excitation at β-diketonate transitions (~350 nm) is shown in Fig. 2. This emission spectrum exhibits characteristic narrow emission bands that are assigned to the $4f^6$-$4f^6$ transitions of Eu(III) ion, emanating from the emitting $^5D_0$ level to the ^7F_J (J = 0, 1, 2, or 4) levels, where the most intense corresponds to $^5D_0 \rightarrow {}^7F_2$ transition taking place around 613 nm. An important feature to be observed is the nonexistence of broaden bands arising from the β-diketonate centered transitions, indicating that intramolecular energy transfer from the β-diketonate ligands to the Eu(III) ion is operative.

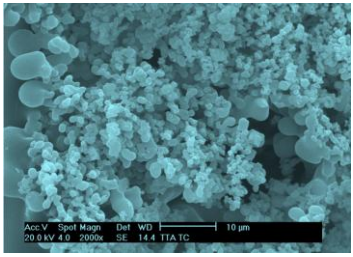

Figure 1 Scanning Electron Microscopy

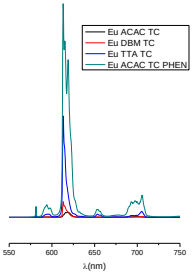

Figure 2 Emission Spectra of Eu(β-diketone)$_3$ TC_2