Spectroscopic Study of RE complexes with aliphatic dicarboxylate ligands

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The metal carboxylate complexes possess a great variety of applications such as porosity, gas storage, catalyses, medical and optical markers. This work reports the synthesis and systematic spectroscopic study of a class of compounds with general formula $[RE_2(L)_3 \cdot x(H_2O)]y(H_2O)$, where RE = Eu^{3+}, Gd^{3+}, Tb^{3+}, "x" values varying from 2 to 6, "y" *values varying from 0 to 4 and L is an aliphatic dicarboxylate containing from 2 up to 12 C atoms. The complexes $[RE_2(L)_3 \cdot x(H_2O)]y(H_2O)$ were synthetized based on literature [1] with yield values around 90% by coprecipitation method. The complexes were characterized via elemental analysis (CHN), thermal analysis (TG), X-ray diffraction (XRD) infrared spectroscopy (FTIR) and scanning electron microscopy (SEM). The CHN, FTIR and TG indicate that the complexes are hydrated. The FTIR spectra indicate that the ligand-metal bonds are via chelate-bridging. The XRD patterns indicate high crystallinity and the systems are isomorphic to the same ligand. The emission spectra, represented by the azelate complexes of Eu^{3+} and Tb^{3+}, present a highly intense red and green-color emission under UV excitation (254 nm), respectively to the Eu^{3+} and Tb^{3+} ions. Moreover, characteristic narrow emission bands arising from the $^5D_0 \rightarrow {}^7F_J$ (J = 0-4) transitions of Eu^{3+}, $^5D_4 \rightarrow {}^7F_J$ (J = 6-0) transitions of Tb^{3+}. The splitting of emission bands of Eu^{3+} complexes suggests high crystallinity and low symmetry around the metal ion, supporting the XRD data.*

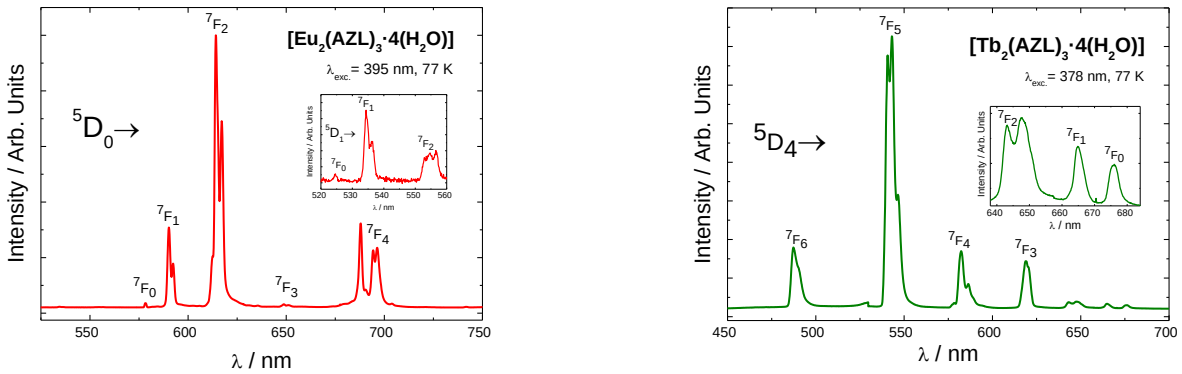

Fig. 1 – Emission spectra of $[Eu_2(AZL)_3 \cdot 4(H_2O)]$ (left) and $[Tb_2(AZL)_3 \cdot 4(H_2O)]$ (right) under 77K.

Keywords: *complexes, rare earths, luminescence, carboxylates.*

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References

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