

Synthesis and luminescent properties of three new and bright Eu - tta compounds modified on α -carbon for use as biological markers

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Three smart luminescent Eu^{3+} complexes (Eu1 = $\text{Eu}(\text{tta-ester})_3\text{phen 1}$, Eu2 = $\text{Eu}(\text{tta-NH}_2)_3\text{phen 2}$, Eu3 = $\text{Eu}(\text{tta-COOH})_3\text{phen}$, were synthesized by using phenanthroline as the neutral ligand and $\text{C}\alpha$ modified 2-thenoyltrifluoroacetate and as the anionic ligand. All the Eu(III) complexes were structurally characterized by spectroscopic methods. Photoluminescence (PL) emission spectra of Eu complexes showed red color emission in the solid state. These materials were analyzed by X-ray diffraction, scanning electron microscopy and by energy dispersive, ultraviolet–visible spectroscopy, luminescence and vacuum ultraviolet–ultraviolet spectroscopies. The spectra show several sharp emission bands ranging from 450 to 750 nm due to the 4f–4f transition from the excited state $^5\text{D}_0$ to the low-lying multiple level $^7\text{F}_J$ ($J = 0, 1, 2, 3$ and 4) of the Eu^{3+} ion. The five main sharp emission peaks were observed at wavelengths of c.a. 579, 591, 613, 653 and 702 nm, which are attributed to the f–f electronic transitions of the Eu(III) ion ($^5\text{D}_0 \rightarrow ^7\text{F}_0$, $^5\text{D}_0 \rightarrow ^7\text{F}_1$, $^5\text{D}_0 \rightarrow ^7\text{F}_2$, $^5\text{D}_0 \rightarrow ^7\text{F}_3$ and $^5\text{D}_0 \rightarrow ^7\text{F}_4$, respectively). These complexes were evaluated also in terms of high energy. VUV-UV emission spectra present the $^5\text{D}_0 \rightarrow ^7\text{F}_2$ the transition dominating the spectrum under excitation at higher energies (Fig.1).

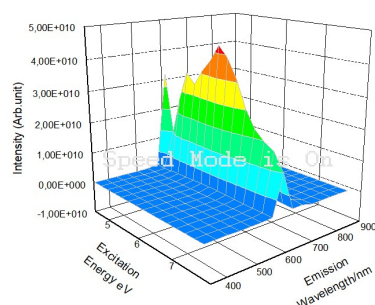


Fig 1. 3D emission spectra recorded under VUV-UV excitation for complex $\text{Eu}(\text{tta-ester})_3$. measured at room temperature. c VUV-UV

References

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