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Investigation of the luminescent properties of aquo Eu^{3+} tris complexes based on nalidixate.

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Lanthanide ions have low molar absorptivity, and thus their direct excitation presents low efficiency. Hence, these ions can be very useful when coordinated by organic ligands as β-diketones and carboxylates. In this study, the ligand used was a quinolone derivative known as nalidixic acid (HNal), a pharmaceutical that has already been used in the treatment of respiratory diseases and urine infections [1]. As a ligand, it has good molar absorptivity and a T_1 state above the main emitting level of Eu^{3+}, ensuring efficiency in energy transfer and good luminescence. The main objective of this work was the synthesis in aqueous solution, characterization and photophysical study of the $[Eu(nal)_3(H_2O)_2]$ complex. The photoluminescent properties of the complex were investigated through the excitation and emission spectra under 300 and 77 K. The excitation spectra show an intense and large band centered on the $S_0 \rightarrow S_n$ transition from the nalidixate ligand, indicating that the excitation can be done in the ligand. In addition, the emission spectra revealed no broadband from de organic moiety, suggesting an efficient $L \rightarrow Eu^{3+}$ energy transfer. Thus, only narrow emission bands arising from the intraconfigurational transitions from europium ion can be seen, and the most prominent is the $^5D_0 \rightarrow {}^7F_2$ [2]. This transition is observed at 614 nm in the spectrum, and is primarily responsible for the intense red emission of this compound when excited at 357 nm. Such spectroscopy results point to a possible application of this complex as a light-converting molecular device (LCMD).

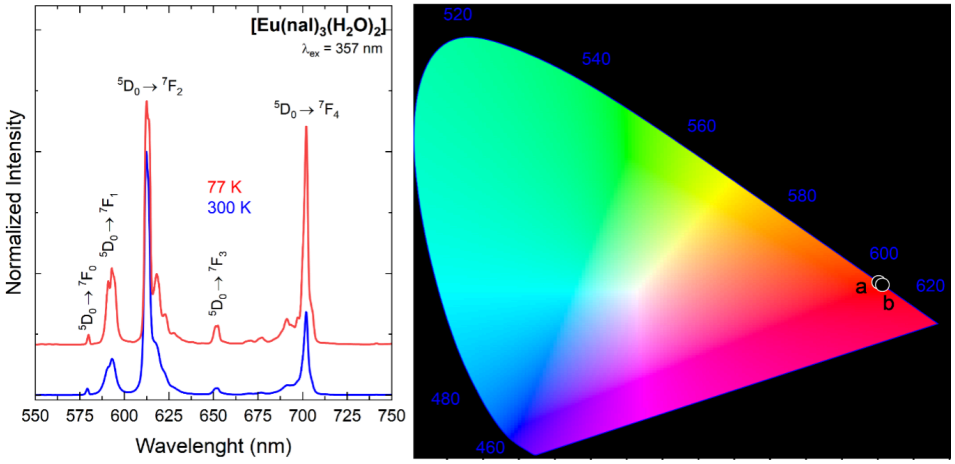

Figure 1. Emission spectra of the $[Eu(nal)_3(H_2O)_2]$ complexes at 77 K (red) and 300 K (blue), excited at 357 nm and its CIE diagram, with 77 K represented by "a" and 300 K represented by "b".

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References

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