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Photoluminescent study of new tris β-diketonate complexes of lanthanide ions containing *N*-(pyridin-2-yl)dodecanamide or *N*-(pyrimidin-2-yl)dodecanamide

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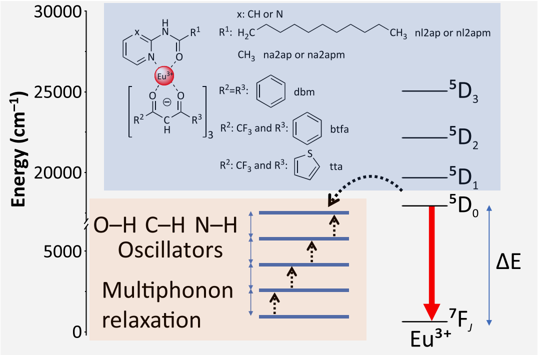
In this work, novel trivalent lanthanide tris-β-diketonate complexes with amides ligands nl2ap (*N*-(pyridin-2-yl)dodecanamide) and nl2apm (*N*-(pyrimidin-2-yl)dodecanamide) were synthesized and characterized by complexometric titration, infrared vibrational spectroscopy, and thermogravimetric analysis. The complexes of general formula [Ln(β-diketonate)$_3$nl2ap] and [Ln(β-diketonate)$_3$nl2apm], with Ln = Eu^{3+} or Gd^{3+}, β-diketonate = btfa (3-benzoyl-1,1,1-trifluoroacetonato), tta (2-tenyltrifluoroacetonato) or dbm (dibenzoylmethanate), were synthesized from the aqua-complexes precursors. The luminescent properties of these complexes were investigated based on the excitation, emission and luminescence decay data. The lifetime of the emitting level, experimental intensity parameters and intrinsic quantum yield were determined. As compared with precursors complexes, the new compounds container amide ligands present high values of intrinsic quantum yield [$Q_{\mathrm{Eu}}^{\mathrm{Eu}}$ (%)] with [Eu(btfa)$_3$nl2apm] standing out with $Q_{\mathrm{Eu}}^{\mathrm{Eu}}$ = 68.5% at 298 K. The complex [Eu(btfa)$_3$nl2ap] showed a lower experimental spontaneous non-radiative decay rate (A_{nrad}) than the literature complex [Eu(btfa)$_3$na2ap] [1]. This behavior was not expected by the multiphonon relaxation, due the first complex has more C-H modes than the second, as are shown in **Figure 1**.

Figure 1. Energy diagram illustrating the multiphonon relaxation with highlighting the compounds structures.



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