Electronic Supplementary Material (ESI) for Organic & Biomolecular Chemistry

Luminescent lanthanide-binding peptides: Sensitising the excited states of Eu(III) and Tb(III) with a 1,8-naphthalimide based antenna

Célia S. Bonnet, Marc Devocelle and Thorfinnur Gunnlaugsson*

Electronic Supplementary Information

Figure S1. ES MS spectrum of **P1**

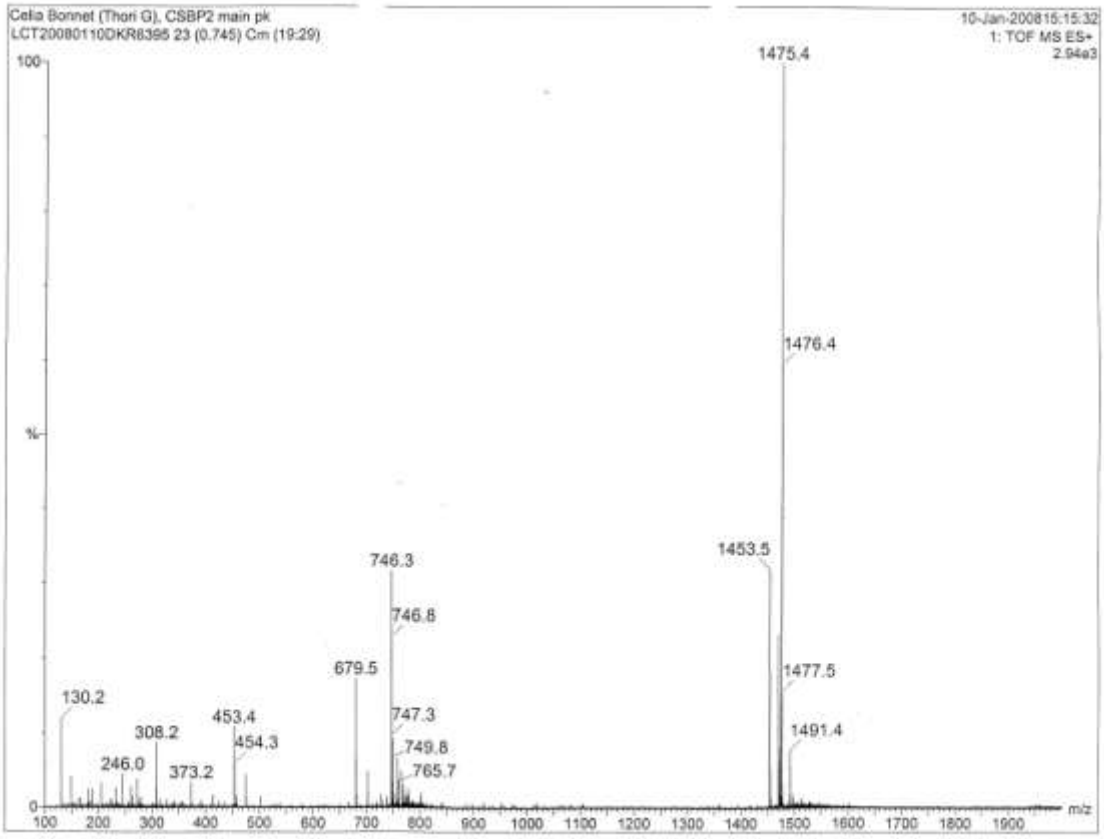

Figure S2. Maldi-Tof spectrum of **P2**

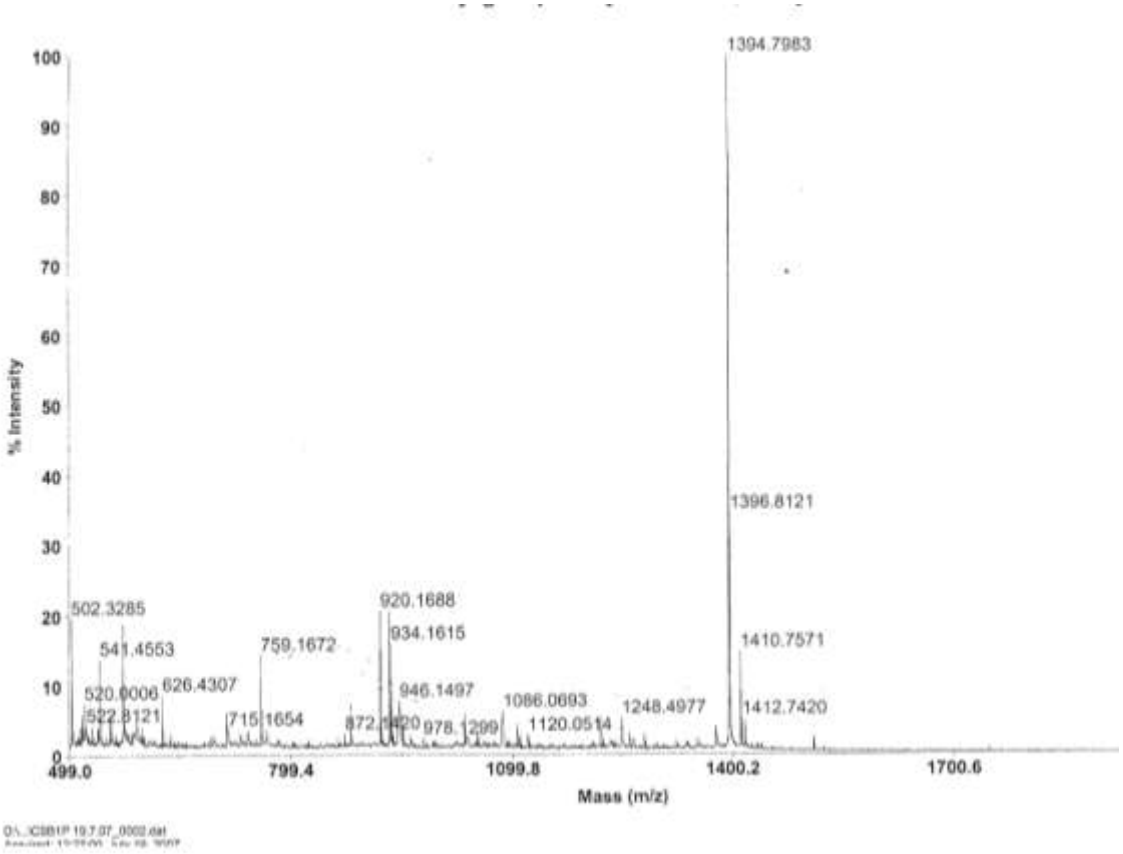

Figure S3. The absorption and the fluorescence emission spectra of **P1** observed upon excitation at 344 nm in pH 7.0 buffered solution (HEPES 10 mM), NaCl 0.1 M.

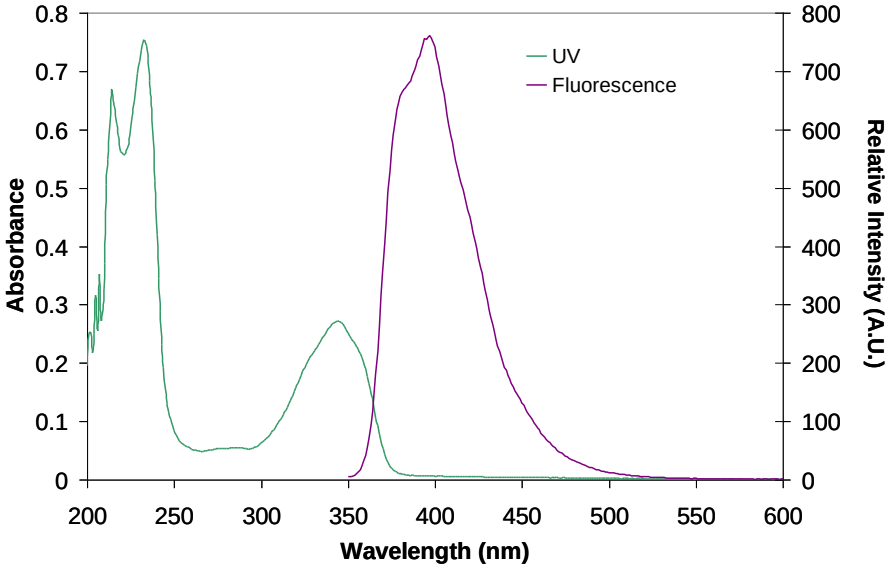

Figure S4. The absorption and the fluorescence emission spectra of **P1** and one equivalent of Eu(III), and the characteristic Eu(III) emission observed upon excitation at 344 nm in pH 7.0 buffered solution (HEPES 10 mM), NaCl 0.1 M. The delayed excitation spectrum recorded upon excitation of the **Naph** moiety and observing the emission of the Eu(III) at 616 nm is also shown.

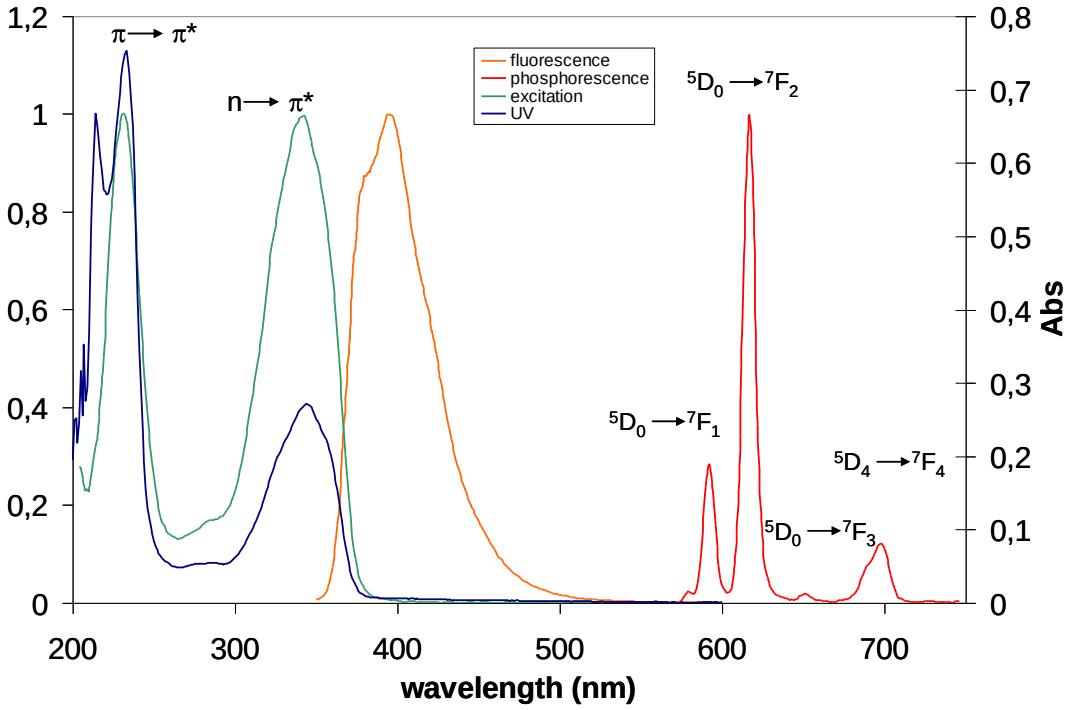

Figure S5. The absorption and the fluorescence emission spectra of **P1** and one equivalent of Tb(III), and the characteristic Tb(III) emission observed upon excitation at 344 nm in pH 7.0 buffered solution (HEPES 10 mM), NaCl 0.1 M. The delayed excitation spectrum recorded upon excitation of the **Naph** moiety and observing the emission of the Tb(III) at 616 nm is also shown.

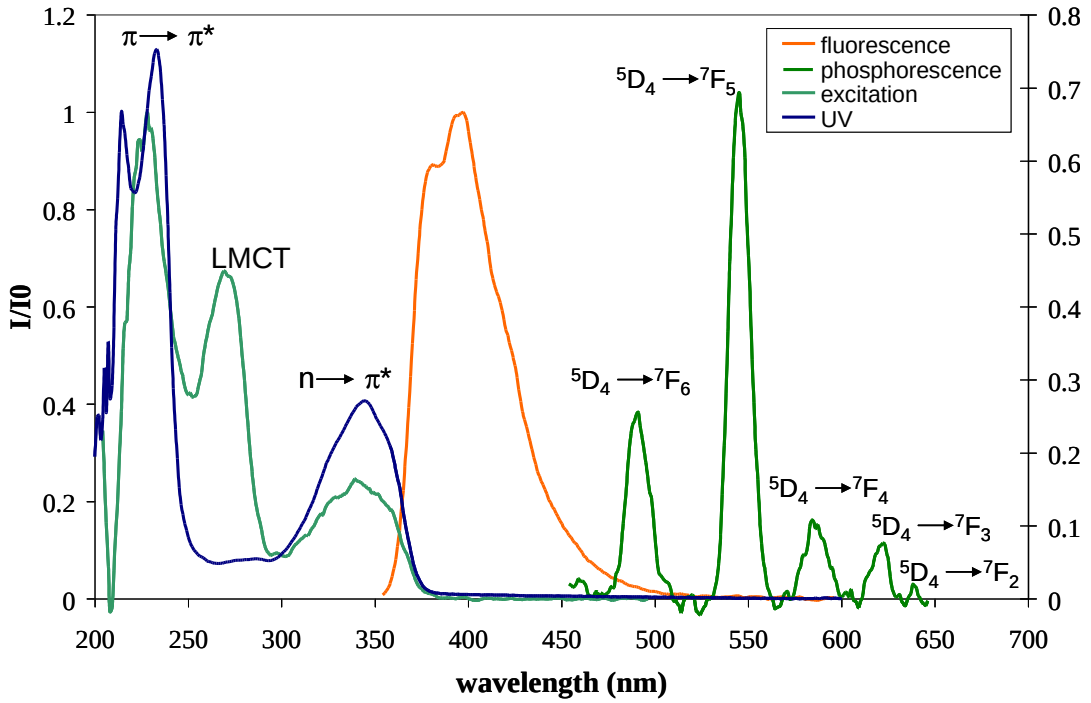

Figure S6. The decrease of the fluorescence emission spectra of **P1** (27 µM) titrated with increasing amount of Eu(III) (0 to 6 eq.) and upon excitation at 344 nm in pH 7.0 buffered solution (HEPES 10 mM), NaCl 0.1 M.

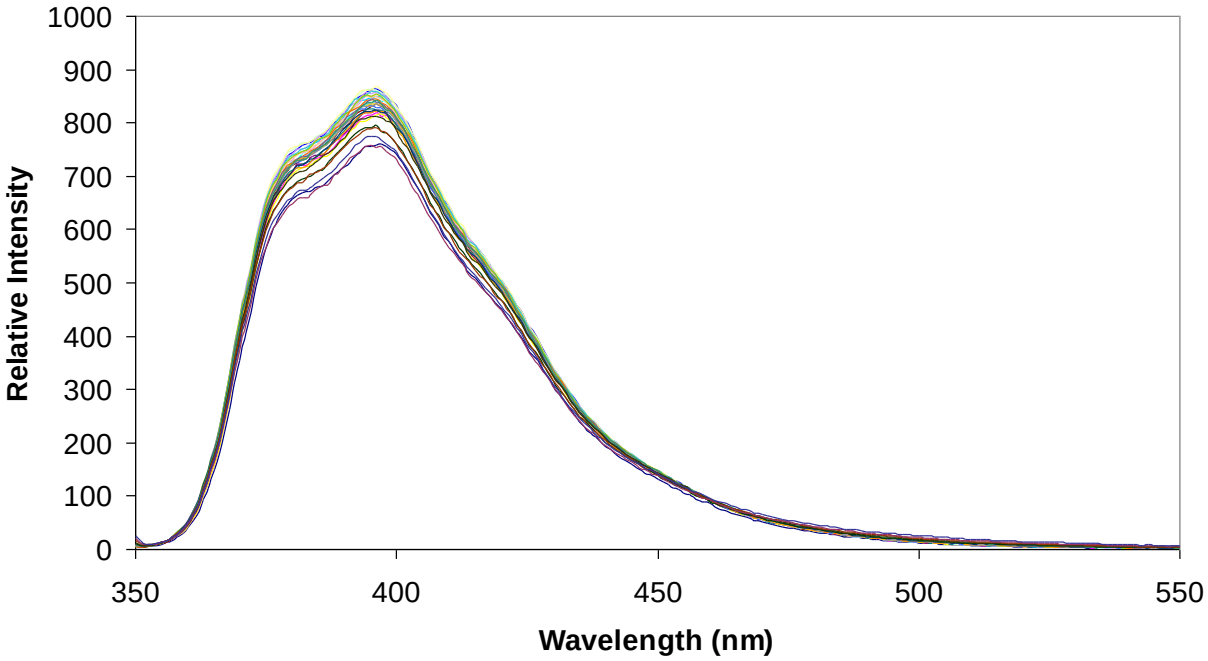

Figure S7. The decrease of the fluorescence emission spectra of **P2** (30 µM) titrated with increasing amount of Tb(III) (0 to 4 eq.) and upon excitation at 280 nm in pH 7.0 buffered solution (HEPES 10 mM), NaCl 0.1 M.

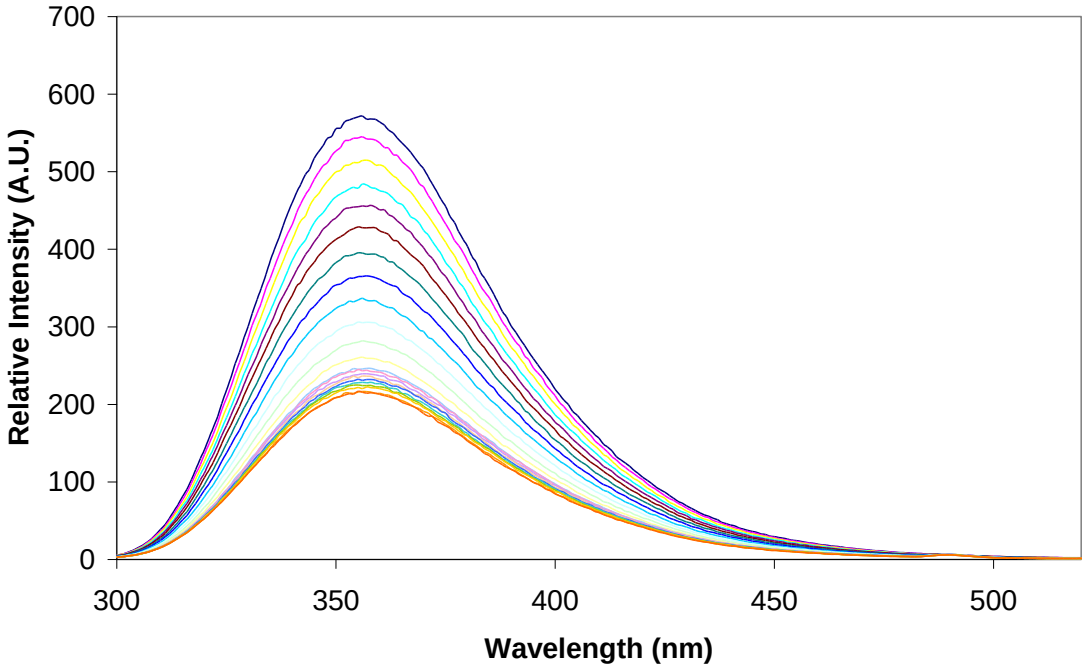

Figure S8. Overall changes in the Tb^{3+} emission upon titrating P2 (31 µM) with $TbCl_3$ at pH 7.0 (10 Mm HEPES) and in 0.1 M NaCl. *Inset* : corresponding titration profile at 545 nm and the best fit obtained using SPECFIT.

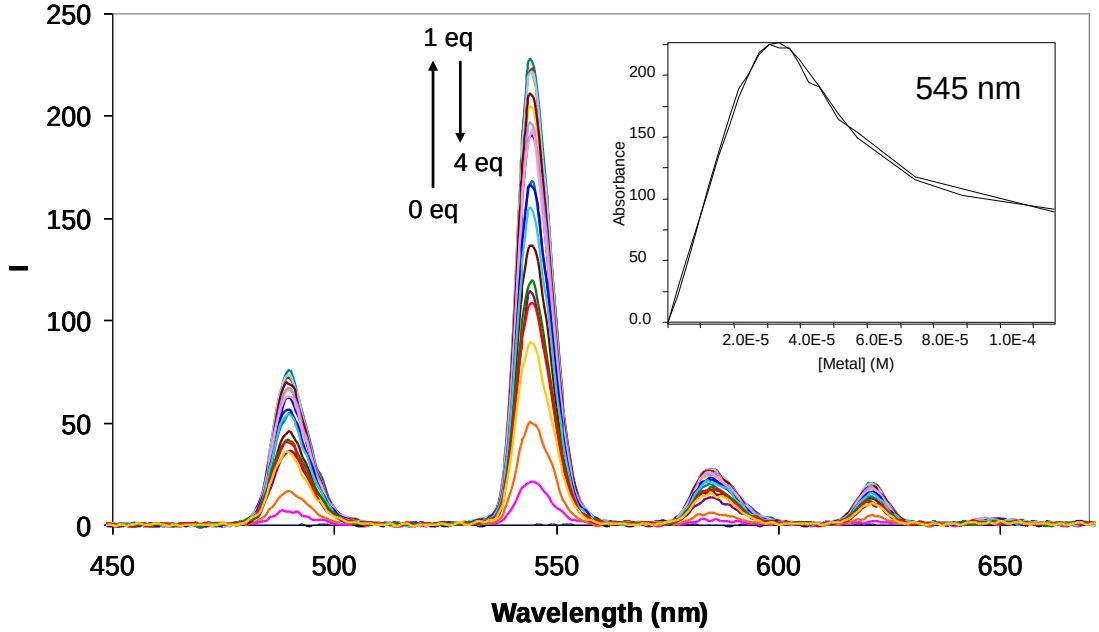

Figure S9. Overall changes in the Eu^{3+} emission upon titrating P2 (31.5 µM) with $TbCl_3$ at pH 7.0 (10 Mm HEPES) and in 0.1 M NaCl. *Inset* : corresponding titration profile at 617 nm and the best fit obtained using SPECFIT.

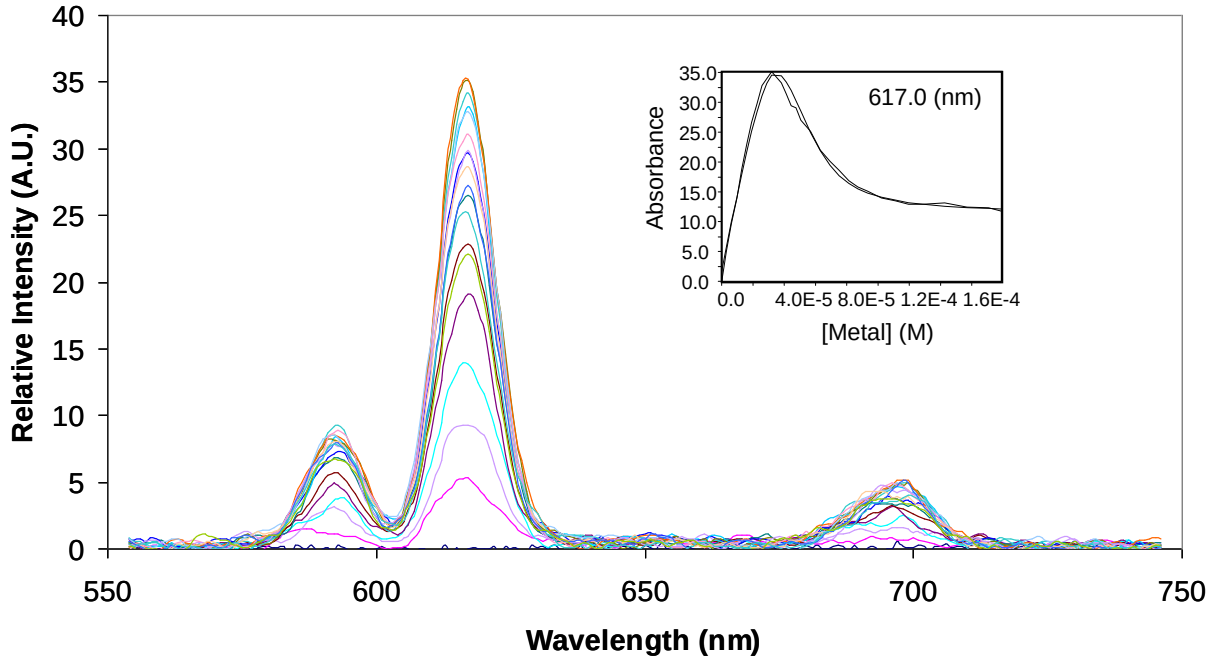

Figure S10. Evolution of the luminescence spectra of P2 (33.4 µM) – Tb^{3+} (132.3 µM) upon titration by $CaCl_2$ and after excitation of Trp at 280 nm at pH 7.0 (10 Mm HEPES) and in 0.1 M NaCl. *Inset* : corresponding titration profile at 550 nm and the best fit obtained using SPECFIT.

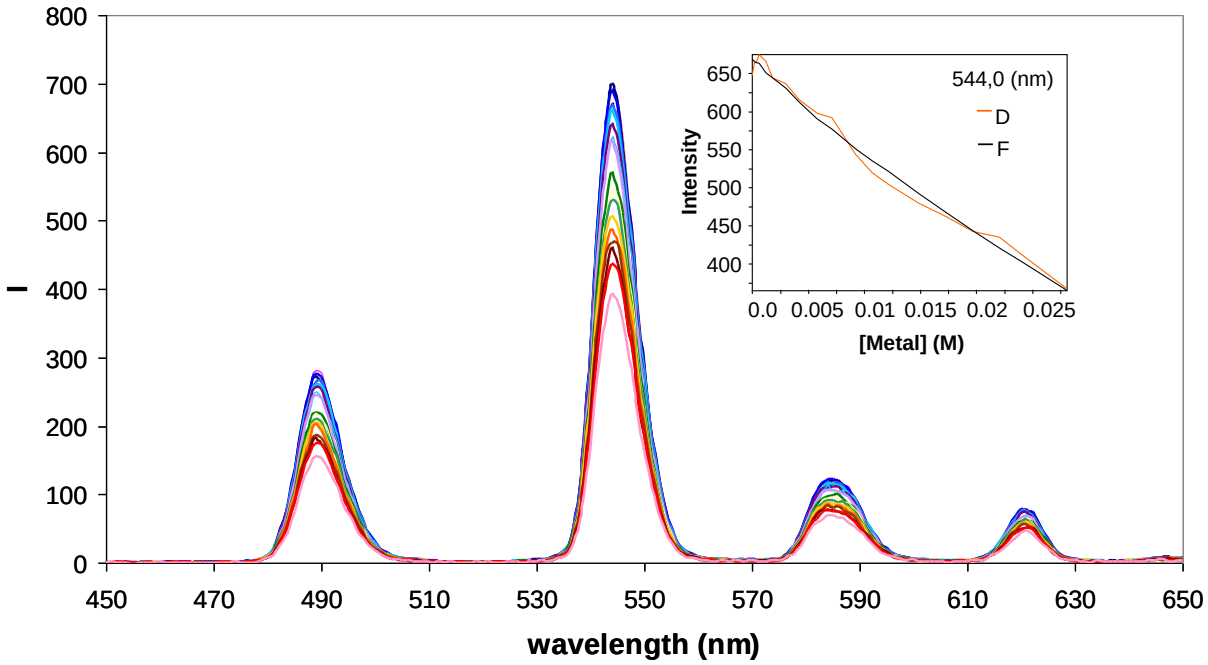

Figure S11. CD-Spectra at 298 K of **P1** in HEPES buffer at pH 7.0 and the changes observed upon addition of one and two equivalents of Eu^{3+}.

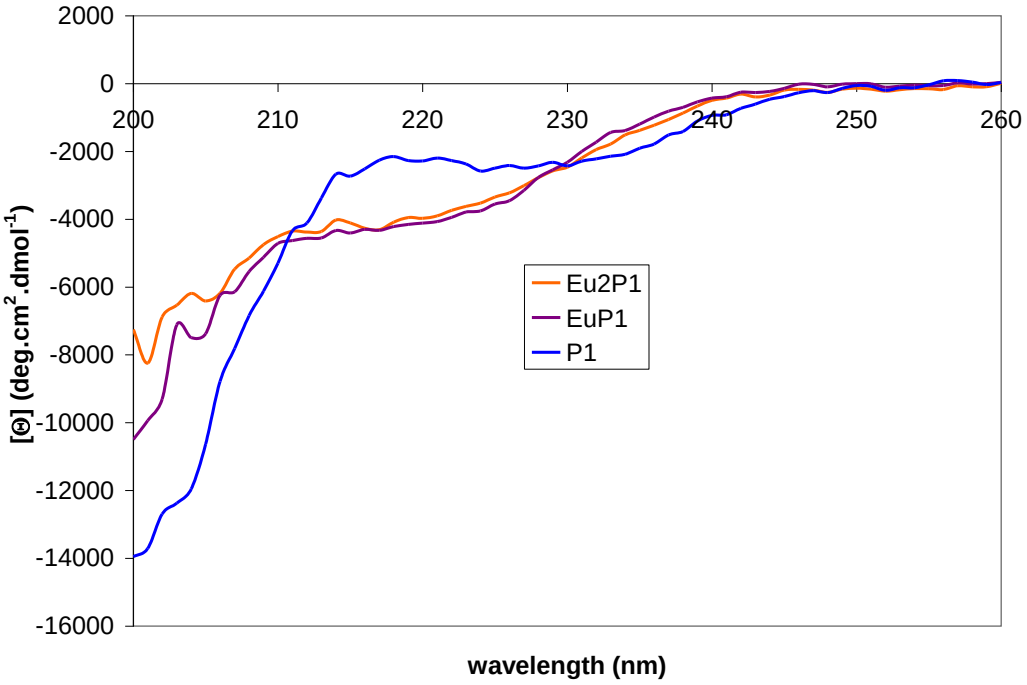

Figure S12. CD-Spectra at 298 K of **P2** in HEPES buffer at pH 7.0 and the changes observed upon addition of one and two equivalents of Tb^{3+}.

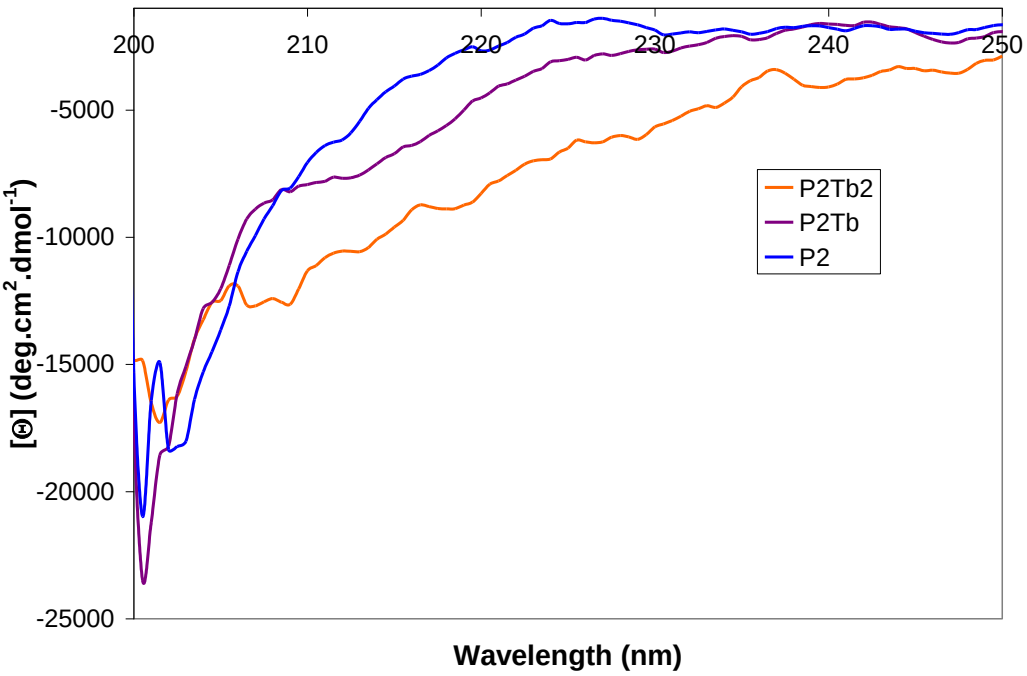

Figure S13. ^{1}H NMR spectra (600 MHz) of **P2**, **P2** basified by NaOH and the corresponding Eu(III) complexes in a mixture 9:1 H_2O:D_2O

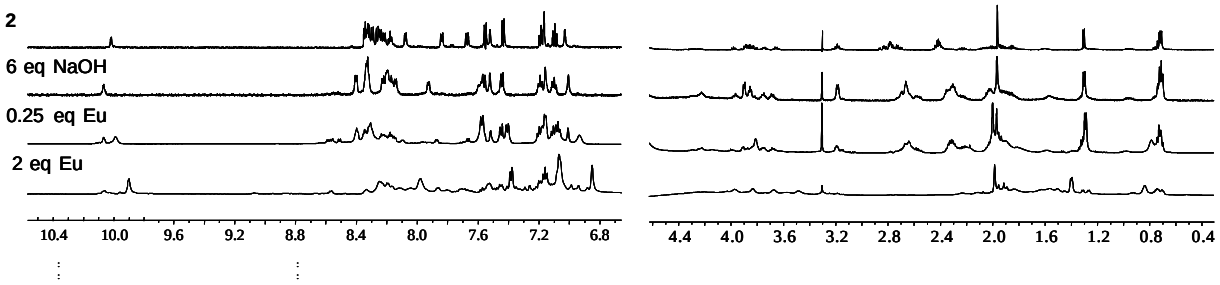

Figure S14. ^{1}H NMR spectra (600 MHz) of **P1**, **P1** basified by NaOH and the corresponding La(III) complexes in a mixture 9:1 H_2O:D_2O