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Influence of temperature on circularly polarized luminescence

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The renewed interest in circularly polarised luminescence (CPL), the emission asymmetry observed for luminescent chiral molecules, is fueled by potential applications such as new bioprobes for microscopy or new optimized dyes for OLED displays. To that aim, lanthanide(III) complexes are nowadays the most promising emitters. While a race for the highest dissymmetry factor (g_{lum}) is underway, there is a need for fundamental studies on chemical models that will determine the characteristics needed to achieve intense CPL. In recent years, we have exploited the remarkable luminescence properties of lanthanides to help determine their ground state splitting; a feature that governs, in particular, their SMM properties. Beyond the high-resolution luminescence spectra obtained at low temperature, we now decided to focus on the chiroptical properties of rare earths. A joint effort of synthesis, computational chemistry and instrumental development has allowed us to obtain first results in the near-IR spectrum with an helical Yb(III) complex based.[1] Our study addresses advantages and limitations of CPL spectroscopy for the determination of the lanthanide energy diagram. Furthermore, it illustrates the influence of temperature on the CPL response for such compounds.

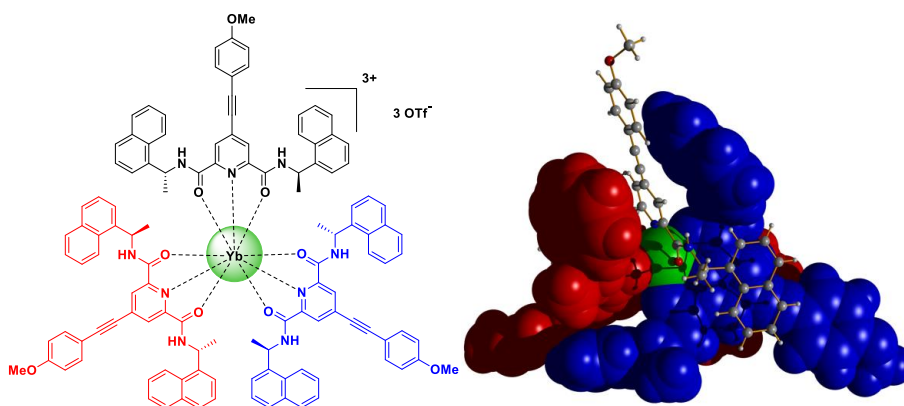


Figure 1. Chemical structure and 3D-representation of the helical Yb³⁺-complex

References

- [1] a) F. Gendron, S. D. Pietro, L. A. Galán, F. Riobé, V. Placide, L. Guy, F. Zinna, L. D. Bari, A. Bensalah-Ledoux, Y. Guyot, G. Pilet, F. Pointillart, B. Baguenard, S. Guy, O. Cador, O. Maury, B. L. Guennic, *Inorganic Chemistry Frontiers* **2021**, 14; b) B. Baguenard, A. Bensalah-Ledoux, L. Guy, F. Riobé, O. Maury, S. Guy, *Nat Commun* **2023**, 14, 1065.