

Chiral lanthanide complexes as CPL emitters

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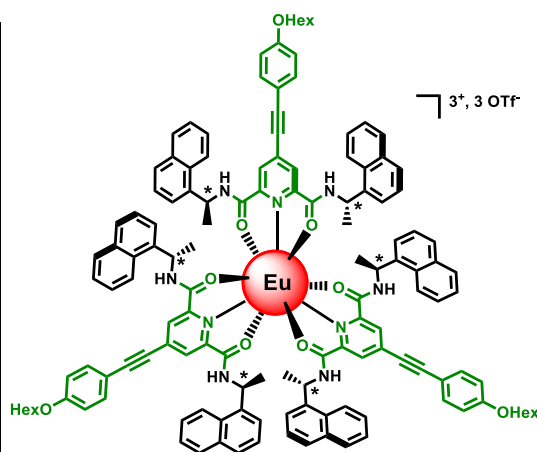
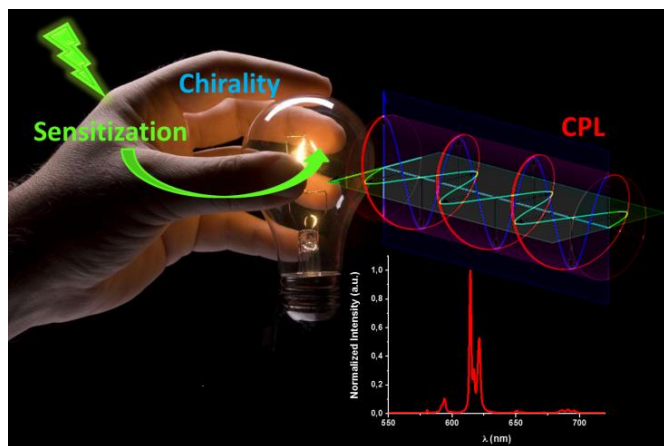
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Chirality is one of the most fundamental features of life and, since Pasteur early works, it has never stopped to fascinate scientists. Nowadays, a renewed interest in circularly polarised luminescence (CPL), the circular asymmetry in the emission from luminescent chiral molecules, is fueled by potential applications such as new bioprobes for microscopy or optimized dyes for OLED displays. To that aim, lanthanide(III) complexes are by far the most promising emitters.^{1,2} While a race for the highest dissymmetry factor (g_{lum}) is underway, there is a need for a better understanding of the required features to achieve intense CPL.

In the course of an ongoing ANR project, our team is designing chiral lanthanide complexes (see figure) that have already shown intense CPL in the visible and nIR range.³ In collaboration with theoreticians (ISCR, Rennes), we aim to correlate the CPL of the rare earth with the surrounding molecular structure (coordination polyhedron, dynamic coupling with the ligand...). In parallel with luminescence studies, chiroptical properties will also help us to determine the precise ground state crystal field splitting of each lanthanide and rationalize related magnetic properties.

The recruited post-doc will pursue this effort by carrying on the synthesis of new ligands varying the symmetry around several lanthanide ions (Eu^{3+} , Tb^{3+} , Dy^{3+} , Yb^{3+} ...). S/he will perform the luminescence measurements and be involved into the chiroptic measurements performed on home-made CPL spectrophotometer allowing fast acquisition and low temperature measurements.



Profile: We look for an organic chemist with a motivation for such multidisciplinary subjects. A prior experience with coordination compounds and/or luminescence studies would be appreciated. Ideally, the candidate should have obtained her/his PhD less than 1 year before the starting date.

Duration: 12 months

Starting date: October-December 2021

Location: Synthesis and luminescence measurements performed in Chemistry laboratory of ENS Lyon, CPL measurements with collaborators of ILM, Lyon.

- (1) Arrico, L.; Di Bari, L.; Zinna, F. Quantifying the Overall Efficiency of Circularly Polarized Emitters. *Chem. – Eur. J.* **2021**, *27* (9), 2920–2934.
- (2) Zinna, F.; Di Bari, L. Lanthanide Circularly Polarized Luminescence: Bases and Applications. *Chirality* **2015**, *27* (1), 1–13.
- (3) Gendron, F.; Di Pietro, S.; Abad Galán, L.; Riobé, F.; Placide, V.; Guy, L.; Zinna, F.; Di Bari, L.; Bensalah-Ledoux, A.; Guyot, Y.; Pilet, G.; Pointillart, F.; Baguenard, B.; Guy, S.; Cador, O.; Maury, O.; Le Guennic, B. Luminescence, Chiroptical, Magnetic and *Ab Initio* Crystal-Field Characterizations of an Enantiopure Helicoidal Yb(III) Complex. *Inorg. Chem. Front.* **2021**, *8* (4), 914–926.