PhD Position: Circularly Polarized Luminescence Redox Switching of Lanthanide Organometallic Complexes

Host laboratory: Institute of Chemical Sciences of Rennes (ISCR), "Organometallics: Materials and Catalysis" team, Multifunctionnal Molecular Materials group.
PhD-University of Rennes (LUMOMAT)
Duration: 36 months
Expected starting date: October 2026
Contacts: **Dr. Fabrice POINTILLART**: +33(0)223236752, email: fabrice.pointillart@univ-rennes.fr

Keywords: Lanthanides, redox-active ligands, circularly polarized luminescence, molecular magnetism

Description of the project: Circularly Polarized Luminescence (CPL) measures the difference in emission between right- and left-circularly polarized light from chiral molecules. It has potential applications in light-emitting devices, data storage, and sensing. The key parameter, the dissymmetry factor (g_{CPL}), is typically very small (<0.01) for organic molecules but can reach much higher values (up to ~1.5) in chiral lanthanide complexes. Developing chiroptical switches—especially based on lanthanide complexes capable of CPL switching—offers promising opportunities for enhancing data storage density, improving security technologies, and advancing sensing applications. **The aim of this project is to design, synthetize and study redox-switchable chiral organometallic lanthanide systems with CPL response**. Through **multistep organic synthesis** redox-active tetrathiafulvalene core can be decorated with chiral and coordinating chemical groups to target lanthanide complexes displaying (chir)optical properties (Figure).

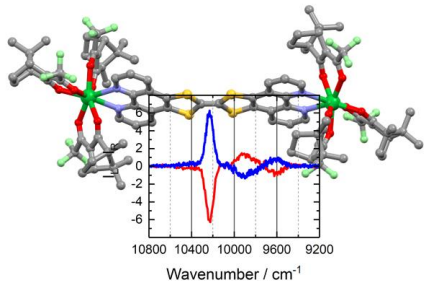

Fig. 1 : Example of redox-active chiral lanthanide systems presenting CPL.

In this LUMOMAT research project, the PhD candidate will develop skills in the multistep synthesis of organic ligands, their association with lanthanide ions, the study of their (chir)optical and magnetic properties, and will benefit from interactions with specialists in various spectroscopies and in theoretical chemistry. A central part of the project involves a collaboration with the **Jagiellonian University in Krakow** (Poland), where the candidate will **spend eight months** (spread across multiple stays) in the research group of Prof. Dawid Pinkowicz where the candidate will be trained to lanthanide organometallic chemistry.
Candidate profile: A motivated student with a very good knowledge in **organic synthesis** is required. **Coordination/organometallic chemistry** skills together with interest for a multidisciplinary project going beyond chemistry will be appreciated. The University offers French courses for foreigners and hosts an international Erasmus Mundus program Rennes is a medium size French city less one hour and half away from Paris, offering a relaxing life style with many cultural and sport activities.

Applications must include a detailed CV, two references (people who may be contacted) and a cover letter and be sent by email to fabrice.pointillart@univ-rennes.fr

Deadline for application: 15th June 2026