PhD Position in Molecular Chemistry at Sorbonne Université (Paris, France)

Title: *Design and Synthesis of Molecular Photoswitches based on Metal-Metal Electron Transfer*

Context

The doctoral project will take place within the framework of the recently funded ANR research program *SMA:RTS – Synergistic Metal-ligand Adaptation: a path to Room-Temperature photo(magnetic)Switches*. The general ambition of SMA:RTS is to design and understand innovative molecular systems capable of reversibly switching their magnetic and optical properties under light irradiation. A key challenge is to raise the operating temperature at which reversible ON/OFF photomagnetic effects can be observed—an essential step toward real-world applications in photonics, optoelectronics, data storage, and responsive molecular devices.

The consortium gathers three complementary partners: Sorbonne Université (coordination and organic chemistry), Université de Rennes (advanced photophysical characterization), and CNRS/Université de Rennes (theoretical chemistry). The PhD candidate will be hosted at Sorbonne Université (Institut Parisien de Chimie Moléculaire, IPCM) under the supervision of Prof. Rodrigue Lescouëzec and Prof. Candice Botuha, with close interactions with the Rennes partners.

Scientific Objectives

The PhD student will focus on the **synthesis and molecular engineering of new ligands and Fe–Co complexes** able to undergo **photoinduced metal-metal electron transfer**. One of the goal is to better control the structural reorganization coupled to the electronic state change, for stabilizing the photoinduced metastable state and pushing the relaxation temperature (T-relax) closer to room temperature.

The student will:

- Design and synthesize new functional organic ligands.
- Assemble Fe–Co complexes (squares, cubes, or related architectures) through coordination chemistry.
- Characterize the complexes structurally and electronically using NMR, IR, UV-vis, electrochemistry, mass spectrometry, and single-crystal X-ray diffraction.
- Investigate their magnetic and photomagnetic properties (SQUID magnetometry, photomagnetic measurements) at IPCM.
- Actively contribute to the conceptual design of molecular architectures and switching mechanisms.

The candidate's results will provide the foundation for advanced time-resolved spectroscopic and theoretical studies performed in Rennes, requiring both scientific initiative and collaborative engagement.

Profile of the Candidate

We are seeking a highly motivated candidate with:

- A Master's degree (or equivalent) in chemistry, with strong background in **coordination chemistry or molecular chemistry**.
- Interest and preferably some experience in **multistep organic synthesis** and/or **coordination chemistry**.
- Curiosity for interdisciplinary research at the interface of chemistry, physics, and materials science.

- Good communication skills in English (both oral and written).
- A proactive mindset and willingness to participate in the design of molecular systems and collaborative project development.

Experience in crystallography, electrochemistry, or molecular magnetism will be an asset but is not mandatory.

Environment and Training
The successful candidate will join the IPCM laboratory at Sorbonne Université in Paris, benefiting from a stimulating scientific environment with access to state-of-the-art facilities in molecular synthesis, crystallography, and magnetic characterization. The student will receive high-level training in synthetic chemistry, structural characterization, and molecular materials science.

He/she will also interact closely with physicists and theoreticians in Rennes, acquiring complementary knowledge in ultrafast spectroscopy and computational chemistry. The project thus offers a unique opportunity for interdisciplinary training in a highly active international research field.

Practical Information

- **Location:** Institut Parisien de Chimie Moléculaire (IPCM), Sorbonne Université, Paris.
- **Supervision:** Prof. Rodrigue Lescouëzec & Prof. Candice Botuha.
- **Duration:** 36 months.
- **Starting date:** Autumn 2025 (flexible).
- **Funding:** ANR grant. Approx. 2300 € gross salary.

Application
Candidates should send a CV, academic transcripts, a motivation letter, and contact details of at least one referee to [rodrigue.lescouezec@sorbonne-universite.fr, candice.botuha@sorbonne-universite.fr]. Review of applications will begin immediately and continue until the position is filled.