

Postdoctoral position available at the Laboratory of Chemistry, ENS Lyon, France

Chiral molecular receptors for redox photocatalysis in confined space

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Key words: multi-steps organic synthesis, chirality, host-guest chemistry, photocatalytic properties.

Scientific context

Photocatalysis allows the synthesis of important molecules with high added value, under mild, metal-free and eco-compatible conditions, using light as an energy source.^[1] To this end, it is necessary to have a stable photoactive molecule to allow electrons transfers to the substrate of interest. This project, aims **to the enantioselective synthesis of atropisomers using supramolecular photocatalysis**.^[2] The substrates targeted here are chiral atropisomeric bi-aryls involved in the synthesis of numerous bioactive compounds.^[3] This is a multidisciplinary project involving four French laboratories in Lyon, Strasbourg, and Marseille.

Work plan

Here, we propose a **supramolecular approach for the enantioselective and catalytic synthesis of these bi-aryls**. Supramolecular chemistry allows association and spatial organization of different entities via reversible chemical bonds.^[4] One of the best-known examples is host-guest chemistry where a molecular cage can reversibly encapsulate a substrate, which can then be transformed with control of reactivity and selectivity by pre-organizing the substrates and stabilizing the transition state. The task of the post-doctoral researcher will **be to design original chiral molecular receptors** based on strategies developed in our team. This includes **multi-steps organic synthesis and characterization of new cavitand type molecules for the design of molecular cages associating a chiral molecular cavity** (recognition site) **and a porphyrin moiety** (photocatalytic site) (Fig. 1).^[5] Besides, characterization and physico-chemical studies will be performed. More precisely, recognition phenomena of chosen aromatic substrates, by the new synthesized host molecules, will be studied mainly by NMR spectroscopy.^[6]

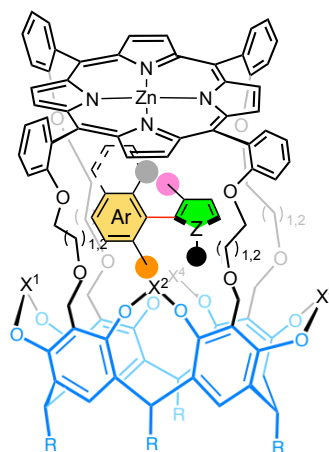


Fig. 1. Schematic view of the cavitand-porphyrin supramolecular catalyst and chiral bi-aryl atropisomer (X1-X4: bridging units inducing chirality)

Scientific environment

This collaborative research program, funded by the French *National Research Agency (AtropoPhotoCat project, 2023)*, associates researchers from ENS Lyon (Laboratory of Chemistry), University of Strasbourg (LSAMM and LCQ), and Aix-Marseille University (iSm2, Chirosciences). The post-doctoral researcher will take the full advantage of the stimulating environment of the Chemistry Laboratory of ENS Lyon and the strong experience of the research team in cavitands design, molecular chirality and molecular recognition. He or she will have continuous contacts with other teams involved in the project and will participate to common meetings, opening many opportunities to discuss additional topics related to the project.

Candidate profile

We are looking for a **highly motivated synthetic organic chemist with an interest for supramolecular chemistry and photocatalytic properties studies**. Additionally, the candidate must have skills in multi-step syntheses and solid experience in usual analytical techniques (NMR, IR, UV-vis abs., etc.). The candidate must hold a PhD in organic chemistry. Expertise in the fields of photophysics and photocatalysis is valuable but not mandatory. The post-doctoral fellow will be offered a 12 or 18-months full time position starting from spring 2024 (with possible extension).

Stipend: between 2750 € and 2900 € gross monthly depending on experience after the PhD.

Application and contacts

For additional information you can contact the supervisors: Dr. N. de Rycke and Dr. J.-P. Dutasta. To apply, please e-mail a complete CV and a list of publications, reference letters or names of references, and a letter of application to:

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