Master 2 Internship subject proposal
Academic year 2025-2026

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Porphyrin receptors for redox photocatalysis.

Catalysis in confined space is a method of choice for controlling the reactivity and selectivity of chemical and photochemical reactions.[1] This project proposes to combine[2] redox photocatalysis[3] and supramolecular chemistry by designing three-dimensional chiral architectures that can preorganize substrates via reversible interactions (Fig. 1).
The targeted molecules are atropisomers, an important class of chiral molecules whose enantioselective synthesis can represent a challenge and requires the development of efficient original, highly selective, and environmentally-friendly reactions.[4] More specifically, (hetero)biaryls are of recognized interest for the design of bioactive molecules and asymmetric catalysis.
The potential of porphyrins as redox photocatalysts in organic synthesis has recently been demonstrated,[5] and molecular cages incorporating porphyrins have been shown to be effective both for molecular recognition and supramolecular catalysis.[6]
The objective of the internship is the synthesis of components of porphyrin cage catalysts, as well as the exploration of their reactivity in redox photocatalysis. This constitutes the first step of the photocatalyzed enantioselective synthesis of atropisomers, in the frame of the AtropoPhotoCat project (ANR AAPG 2023), involving collaborators in Strasbourg, Lyon and Marseille.

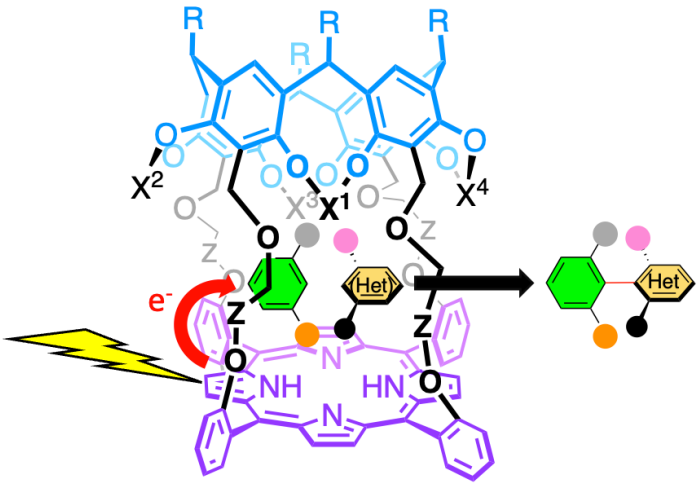

Figure 1: Principle of photoredox catalysis of a supramolecular porphyrin-based cage.
(Hetero)aryls are stabilized in the cavity formed by a porphyrin (purple) linked to a capping unit (blue).
Under visible light irradiation, electron transfer from the porphyrin
to one substrate triggers the conversion to one atropisomer.

Application: please send CV, motivation letter and Bachelor and Master 1 final grades to Dr. Stephanie Durot, sdurot@unistra.fr

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[3] Prier, C. K. Rankic, D. A., MacMillan, D. W. C., *Chem. Rev.* **2013**, *113*, 5322.
[4] Cheng, J. K., Xiang, S.-H., Li, S., Ye, L., Tan, B., *Chem. Rev.* **2021**, *121*, 4805.
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