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Team CORAIL, Research axes: Organocatalysis and Photooxygenation
(Dr. V. Coeffard, Dr. P. Nun)

PhD offer 2023-2026 starting from Oct. 2023

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Atroposelective Construction of Axially Chiral Aryl-Quinolone Architectures for Applications in Catalysis

Research: Axially chiral molecules are not only common structural subunits in a vast array of natural products and biologically active molecules, but they are also key components for stereoselective transformations in which they act as chiral inductors (ligands or catalysts).^[1] Various synthetic strategies have been reported for the preparation of diversely functionalized enantioenriched biphenyl, phenyl-naphthyl, and binaphthyl architectures. In stark contrast, examples of enantioselective synthesis of aryl-heterocyclic atropisomers remain far less described in the literature while these compounds hold great promise in asymmetric catalysis owing to the ability of heteroatoms to coordinate metal atoms. Amongst the heterocyclic structures, 4-quinolone is an important motif found in natural products and biologically relevant compounds exhibiting antibacterial, antimalarial, antiviral and anticancer activities. Besides, 4-quinolone derivatives have found applications as ligands in metal-catalysed processes.^[2] In line with the team's expertise in the development of synthetic methodologies involving asymmetric organocatalysis,^[3] the project aims at developing new axially-chiral (pre-)catalysts through the implementation of organocatalytic transformations (Collaborations: Prof. X. Moreau, University of Versailles Saint-Quentin-en-Yvelines and Prof. I. Chataigner, University of Rouen-Normandie) for applications in various enantioselective oxidative processes. The development of enantioselective photooxygenation processes for applications in organic synthesis will be a research topic also considered during the PhD studies.^[4]

Candidate profile and application :

The candidates for the PhD position must demonstrate excellent skills in organic synthesis. Knowledge in asymmetric catalysis and/or photochemistry would be an asset. The applicant should have a Master's degree in chemistry with a strong knowledge of organic chemistry. Please send your application including a CV with the contact information of at least two references, transcripts of records and a motivation letter to Dr. Vincent Coeffard (vincent.coeffard@univ-nantes.fr).

[1] Axially Chiral Compounds: Asymmetric Synthesis and Applications; Tan, B., Ed.; WILEY-VCH GmbH, 2021. [2] Li, J. Xie and coll. *Appl. Organomet. Chem.* **2019**, *33*, 5195. [3] a) P. Nun, V. Coeffard and coll. *J. Org. Chem.* **2020**, *85*, 10603; b) *J. Org. Chem.* **2018**, *83*, 1019. [4] a) Coeffard and coll. *Adv. Synth. Catal.* **2023**, *365*, 194; b) *Chem. Commun.* **2019**, *55*, 7398; c) *Chem. Eur. J.* **2018**, *24*, 4790.