M2R INTERNSHIP OFFER IN SUPRAMOLECULAR CATALYSIS

(6 months, starting from January 2024, Toulouse)

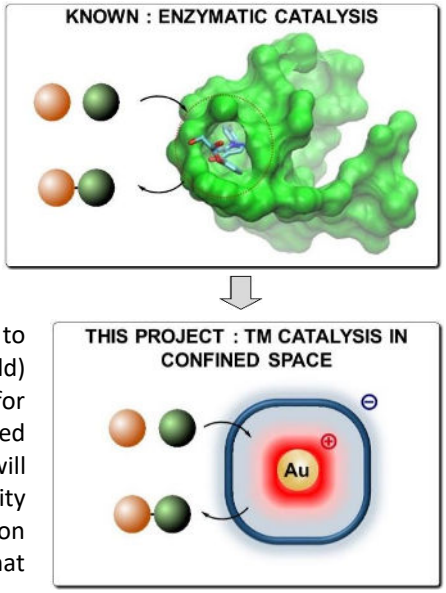
TITLE OF THE PROJECT: DEVELOPING NEW REACTIVITY FOR TRANSITION METAL COMPLEXES WITHIN CONFINED ENVIRONMENTS

KEYWORDS: Supramolecular chemistry, transition metal complexes, catalysis

LABORATORY: Laboratoire Hétérochimie Fondamentale et Appliquée

SUPERVISORS: Gyorgy SZALOKI (05 61 55 77 41, gyorgy.szaloki@univ-tlse3.fr)
Didier BOURISSOU (05 61 55 61 23, didier.bourissou@univ-tlse3.fr)

CONTEXT: Enzymes are nature's catalysts that enable the synthesis of complex bio-molecules in living systems. They efficiently catalyze a large variety of biological reactions through confinement of reactive intermediates within their cavities (enzyme pocket). In order to, mimic nature's strategy, chemists have sought to reproduce this confinement phenomenon in artificial cavities (e.g. supramolecular cages). Indeed, this has been proven successful and the impact of confinement on both rate and selectivity of certain reactions have been evidenced. Unfortunately, the efficiency of these supramolecular cages lags far behind that their natural analogues. Therefore new confinement strategies are highly desired.[1]



OBJECTIVES AND RESEARCH PLAN: In the framework of this project we aim to study and develop the reactivity of transition metal complexes (particularly gold) within confined environments.[2] The main objective is to find new reactivity for these metals by taking advantage of the confinement effect. Our proposed methodology is to design and synthesize, anionic supramolecular cages that will be used to generate and confine reactive, cationic gold complexes. The reactivity of these complexes will be studied in oxidative addition and macrocyclization reactions. Our group has a strong interest and experience in gold chemistry, that we wish to further develop in a supramolecular context.[3]

REQUIRED AND OFFERED SKILLS: We are looking for a motivated candidate with good synthetic skills. A good background in organic/organometallic chemistry and the knowledge of basic analytical techniques (NMR, UV, MS) would be appreciated. The candidate will have the possibility to acquire skills in the preparation (self-assembly, dynamic covalent chemistry) and characterization (DOSY, NOESY, HRMS, NMR/UV-titration) of supramolecular cages and inclusion complexes.

USEFUL INFROMATION: Salary (net) 717 €/month. The internship will be supported by the CONFICAT (ANR-JCJC 2023) funding and could eventually lead to a PhD position as a continuation of the project.

References:

[1] Morimoto, M.; Bierschenk, S. M.; Xia, K. T.; Bergman, R. G.; Raymond, K. N.; Toste F; D. *Nat. Catal*. **2020**, *3*, 969.
[2] Jans, A. C. H.; Caumes, X.; Reek, J. N. H. *ChemCatChem* **2019**, *11*, 287.
[3] (a) Rodriguez, J.; Szalóki, G.; Carizzo, E. D; S.; Saffon-Merceron, N.; Miqueu, K.; Bourissou, D. *Angew. Chem. Int. Ed*. **2020**, *59*, 1511. (b) Szalóki, G.; Babinot, J.; Martin-Diaconescu, V.; Mallet-Ladeira, S.; García-Rodeja, Y.; Miqueu, K.; Bourissou, D. *Chem. Sci*. **2022**, 13, 10499.