Postdoctoral POSITION

at the

Institut Parisien de Chimie Moléculaire

in Paris, France

Starting date: January 2022

SUPRAMOLECULAR HELICAL CATALYSTS FOR COOPERATIVE CATALYSIS

Project. Promoting the simultaneous activation of substrates of different nature with well-defined catalytic systems is a desirable evolution in organic synthesis. Along this direction, the combination of two distinct catalysts can promote catalytic reactions that prove out of reach for mono-functional catalytic systems. Asymmetric bifunctional catalysts, which integrate separate catalytic moieties and functional groups in the same mono-component chiral molecular framework, are particularly efficient.[1] However, small-molecule organocatalysts and metal catalysts reported to date for cooperative activation of substrates are based on a covalent framework that is amenable to functionalization but at the cost of important synthetic efforts. Likewise, the conformational space spanned by these catalysts is often limited, which restricts the number of functional group arrangement accessible with these skeletons. In the framework of the ANR PRC AdECat project, the specific features of our previously developed supramolecular helical scaffold will be exploited for catalytic reactions requiring a dual activation of substrate(s). Towards this goal, we will implement helices composed of different catalytic sites with the aim of improving the efficiency of catalytic reactions, notably through a cooperative activation of the substrate(s).[2] A crucial point is to control the sequence of the monomers in order to favour the interaction between the different catalytic sites. We plan to use a set of complementary monomers functionalized with different chemical groups.

Missions. Synthesis of small functionalized molecules derived from the benzene-1,3,5-tricarboxamide (BTA) scaffold. Implementation of the functionalized BTA assemblies in asymmetric cooperative catalysis.

Laboratory. The postdoctoral research associate will work conjointly with Matthieu Raynal (http://www.ipcm.fr/article708.html) but will be fully integrated in the multi-partner AdECat project, which involves several academic partners in Paris, Bordeaux and Barcelona. Our team has a strong expertise in the preparation and characterization of hydrogen-bonded supramolecular polymers.

[1] (a) J. B. Wang et al., *Science*, **2011**, 331, 1429. (b) Z. C. Girvin et al., *Science*, **2019**, 366, 1528. [2] (a) M. Raynal, F. Portier, P. W. N. M. van Leeuwen, L. Bouteiller, *J. Am. Chem. Soc.*, **2013**, *135*, 17687. (b) A. Desmarchelier, X. Caumes, M. Raynal, A. Vidal-Ferran, P. W. N. M. van Leeuwen, L. Bouteiller, *J. Am. Chem. Soc.*, **2016**, *138*, 4908. (c) J. M. Zimbron, X. Caumes, Y. Li, C. M. Thomas, M. Raynal, L. Bouteiller, *Angew. Chem. Int. Ed.*, **2017**, *56*, 14016. (d) Y. Li, X. Caumes, M. Raynal, L. Bouteiller, *Chem. Commun.*, **2019**, *55*, 2162. (e) Y. Li, L. Bouteiller, M. Raynal, *ChemCatChem*, **2019**, *11*, 5212. (f) Y. Li, A. Hammoud, L. Bouteiller, M. Raynal, *J. Am. Chem. Soc.*, **2020**, *142*, 5676. (g) M. Martinez-Aguirre, Y. Li, N. Vanthuyne, L. Bouteiller, M. Raynal, *Angew. Chem. Int. Ed.*, **2021**, *60*, 4183-4191.

Position. Full time. Expected date of employment: 1st of January 2022. Remuneration: 2600 euros gross monthly salary. Experience: PhD diploma obtained in 2019 or 2020.

Candidate. We are looking for a highly motivated candidate with a strong background in the domains of Organic Synthesis and Homogeneous Catalysis. Strong laboratory skills in the synthesis of small molecules, their purification and their characterization (NMR, FTIR, MS, HPLC) as well as in the design and implementation of transition-metal catalyzed reactions are required. Good background in supramolecular chemistry and polymers, and the related characterization techniques (FTIR, UV, CD, calorimetry), will be strongly appreciated. The communication and supervision skills will also be evaluated (fluent English is required).

For information and to apply, please send your CV, cover letter, and references *asap* to:
matthieu.raynal@sorbonne-universite.fr