Team « Bifunctional Ligands and Biodegradable Polymers » LBPB
Prof. Blanca Martin Vaca and Dr. Didier Bourissou

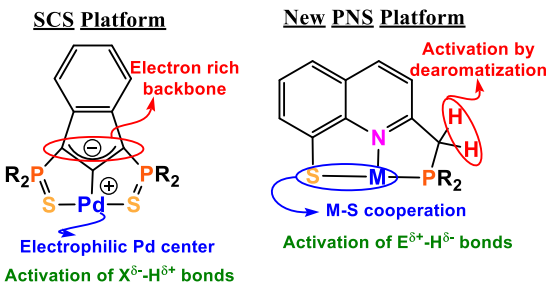
Post-doctoral position in Organometallic Chemistry – Available September 2023
ANR Project – Monthly gross salary 2805 €

NON-INNOCENT LIGANDS AND METAL-LIGAND COOPERATIVE CATALYSIS

A post-doctoral position is available September/October 2023 in the LBPB (Ligands Bifonctionnels et Polymères Biodégradables) group at the LHFA laboratory in Toulouse (France). Our research activities deal with the design of original ligands which impart new properties to the ensuing complexes, and the investigation of their reactivity and applications in catalysis. We are particularly interested in the interplay between main-group and transition metal chemistry and in cooperative effects in organometallic catalysis. Modern analytical and theoretical techniques are applied to determine and rationalize the structure and properties of the compounds prepared. See our website at LBPB team web page.

Context. Over the last decade, *metal/ligand cooperation (MLC)* in catalysis has attracted increasing attention from the scientific community. Thanks to the synergy between the metal center and an active site at one of ligands for the activation of the substrates, extraordinary improvements in efficiency and selectivity can be achieved.[1] Our group has contributed to this domain with a family of *non-innocent pincer* ligands (SCS platform) based on an *indene skeleton* bearing two coordinating side-arms. Remarkable results have been obtained in catalytic cyclisation processes involving the formation of C-O/C-N & C-C bonds with Pd and Pt complexes.[2]

Objectives. We are currently working on the diversification of MLC catalysis with pincer complexes, by developing a new family of PNS(O) pincer ligands deriving from the quinoline moiety. First results with original Pd and Ni complexes are very encouraging as we have evidenced two different sites of *non-innocent* behavior. Their possible application in MLC catalysis has also been proved in heterofunctionalization processes involving $E^{\delta+}$-$H^{\delta-}$ bond activation thanks to Pd-S cooperation. The next step consists in broadening the structural diversity of such complexes (including variations of the metal center), and on the application of their *non-innocent behaviors* in catalytic processes involving $X^{\delta-}$-$H^{\delta+}$ or $E^{\delta+}$-$H^{\delta-}$ bond activation *via* MLC-catalysis.



In summary, this is a proposal dealing with organometallic chemistry and catalysis. It involves the design of non-innocent ligands, synthesis and reactivity investigations on the ensuing TM complexes, and applications in MLC-catalysis. The candidate should have a good knowledge in molecular chemistry, a taste for organometallic / coordination chemistry and he/she should also be trained to the associated technical skills (vacuum-line and glove-box conditions, NMR spectroscopy…). Motivation for research, curiosity and team spirit will be additional assets.

Contact. Application should include a cover letter, a detailed CV with the name and addresses of two referees, and should be sent to Pr. Blanca Martin-Vaca (blanca-maria.martin-vaca@univ-tlse3.fr).

1. Khusnutdinova, J. R.; Milstein, D. *Angew. Chem. Int. Ed.* **2015**, *54*, 12236.
2. (a) Espinosa-Jalapa, N. Á.; Ke, D.; Nebra, N.; Le Goanvic, L.; Mallet-Ladeira, S.; Monot, J.; Martin-Vaca, B.; Bourissou, D. *ACS Catal.*, **2014**, *4*, 3605. (b) Monot, J.; Brunel, P.; Kefalidis, C. E.; Espinosa-Jalapa, N. Á.; Maron, L.; Martin-Vaca, B.; Bourissou, D. *Chem. Sci.* **2016**, *3*, 2179. (c) Clerc, A.; Marelli, E.; Adet, N.; Monot, J.; Martin-Vaca, B.; Bourissou, D. *Chem. Sci.* **2021**, *12*, 435.

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