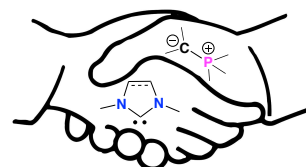


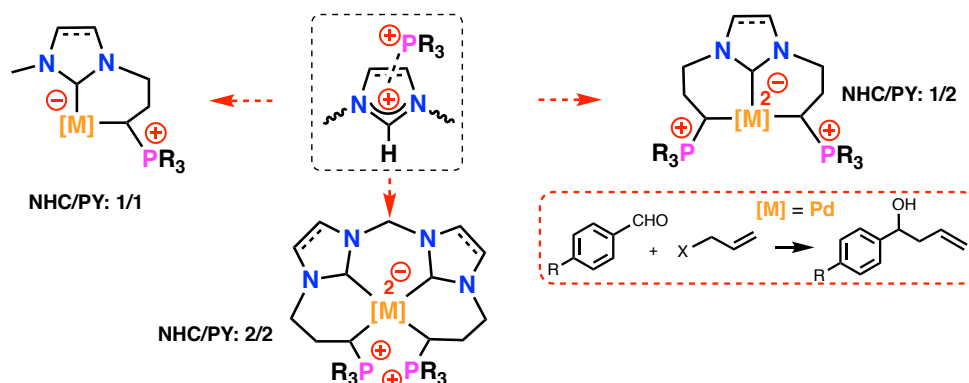
PhD position (2020-2023)

Combining NHC and phosphonium ylide coordinating ends for catalytic applications



Summary of the project:

Multidentate ligands represent attractive auxiliaries in coordination chemistry because they are expected to bring extra stabilization due to the thermodynamically favored chelate effect. Among the large variety of ligands made available, carbon systems have become essential, especially with the emergence of N-heterocyclic carbenes (NHC). Phosphonium ylides (PY: $R_3P^+-CR_2^-$), which represent an alternative class of neutral carbon ligands can also act as Lewis bases in coordination chemistry. Considering the intrinsic features of NHC and phosphonium ylide ligands, similar in terms of electronic properties, but different in terms of bonding mode, the development of multidentate versions combining both carbon extremities appeared as a natural challenge.¹ Electron-rich NHC-phosphonium ylide metal complexes² based on a C_3 propyl bridge were thus recently prepared in the bi-,³ tri-,⁴ and tetradente series.⁵



The strong electron density provided by NHC-phosphonium ylide ligands must benefit the stabilization of metal centers with high oxidation states as well as for applications in homogeneous catalysis. Recent results in the Pd-catalyzed allylation of aldehydes with pincer representatives (NHC/PY: 1/2) confirm the expectations on the influence of phosphonium ylides in transformations requiring strongly donating ligands.⁶

On the basis of these results, the PhD will be devoted to the study of the behavior of NHC-phosphonium ylide-based ligands towards metals of the first row (Mn, Fe, Co, Ni), which have recently demonstrated a considerable potential in homogeneous catalysis.

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Application:

The applicant will have a strong background in molecular chemistry. A previous experience in organometallic chemistry and/or homogeneous catalysis will be advantageously considered. He or she should be highly motivated, enthusiastic, autonomous, and should appreciate working in a team. Applications should include a cover letter and a detailed CV with the name and address of two references.

References related to the project:

- 1- Y. Canac, *Chem. Asian.* **2018**, *13*, 1872.
- 2- Y. Canac, C. Lepetit, *Inorg. Chem.* **2017**, *56*, 667.
- 3- I. Benaissa, R. Taakili, N. Lugan, Y. Canac, *Dalton Trans.* **2017**, *46*, 12293.
- 4- R. Taakili, C. Lepetit, C. Duhayon, D. A. Valyaev, N. Lugan, Y. Canac, *Dalton Trans.* **2019**, *48*, 1709.
- 5- C. Barthes, C. Bijani, N. Lugan, Y. Canac, *Organometallics* **2018**, *37*, 673.
- 6- a) R. Taakili, C. Barthes, A. Goëffon, C. Lepetit, C. Duhayon, D. A. Valyaev, Y. Canac, *Inorg. Chem.* **2020**, *59*, 7082. b) R. Taakili, Y. Canac, *Molecules* **2020**, *25*, 2231.