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Ecole Doctorale des Sciences Fondamentales

SUJET DE THESE

Titre de la thèse : Design, synthesis and catalytic applications of metal-NHC complexes in non-classical conditions

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Metal-NHC (NHC: N-heterocyclic carbene) complexes have become one of the main families of organometallic complexes used in catalysis. While these NHCs have allowed great achievements in this field, the design of original ligands is currently the subject of extensive research. This thesis will focus on studies using the latest developments in the chemistry of metal-NHC complexes and their applications in catalysis.

During this thesis project, the PhD student will carry out the organic synthesis of new ligand precursors, optimize the preparation of organometallic complexes and study catalytic reactions by an appropriate combination of analytical technics.
At the applicative level, palladium and gold catalyzed C-C, C-N and C-O coupling reactions will be studied in unconventional media (water, hydro-alcoholic mixture, etc.). This approach is based on our group's previous research activities on azide-alkyne cycloaddition and hydration of alkynes to methyl ketones under neutral aqueous conditions (Figure 1). This set of results, representative of our approach, shows that metal-NHC complexes with functionalized ligands (to modulate their solubility, for example) have many unexplored applications in homogeneous catalysis.

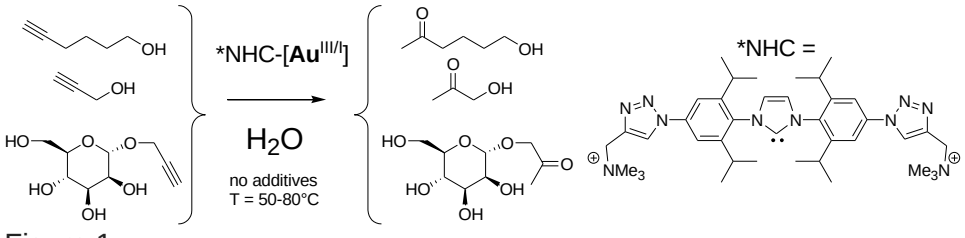

Figure 1.

Applications on this subject are open to French or foreign students. Initial solid formation in organic and / or organometallic chemistry is required. We are looking for a motivated student

who wants to acquire new skills in organic and organometallic synthesis as well as in homogeneous catalysis and interested by a methodological and fundamental approach. The candidate will gain knowledge and experience to allow him / her to pursue a career in both basic, applied research and R & D. A multidisciplinary institute such as the ICCF offers the possibility of dealing with all essential aspects of the subject internally with easy access to all the necessary equipment.

References :

H.Ibrahim, R. Guillot, F. Cisnetti and A. Gautier, *Chem. Commun.* 2014, **50**, 7154-7156.
C. Gaulier, A. Hospital, B. Legeret, A. F. Delmas, V. Aucagne, F. Cisnetti, A. Gautier, *Chem. Commun.*, 2012, **48**, 4005–4007.
H. Ibrahim, P. de Frémont, P. Braunstein, V. Théry, L. Nauton, F. Cisnetti, A. Gautier, *Adv. Synth. Catal,* 2015, **357**, 3893-3900.