Short-term internships available at UWA

Professor Reto Dorta

University of Western Australia
School of Chemistry and Biochemistry
35 Stirling Highway
6009 Crawley, WA, Australia
and Phone: +61 8 6844 3161
Email: reto.dorta@uwa.edu.au
Group webpage: http://dortagroup.scb.uwa.edu.au

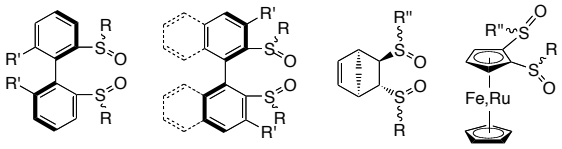
Organometallic Chemistry and Catalysis

Our research is directed toward the preparation of reactive transition metal complexes for stoichiometric and catalytic applications. We focus our attention on the development of new chiral and non-chiral auxiliary ligand systems which are able to bind, activate and functionalize the substrates at the metal center. The ultimate goal of the research program is to identify new ligand families and their corresponding metal complexes for new, more selective or more widely applicable catalytic transformations.
Short-term projects will be such as to provide real insights into new developments in the field of catalyst development and organic synthesis within the timeframe of the project.

PROJECTS

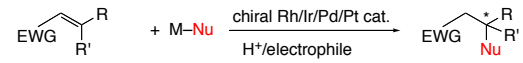
1. Ligand Systems Based on Chiral Sulfoxides and Their Use in Late-Metal Chemistry and Catalysis

Possible disulfoxide ligand structures:



R,R" = alkyl, aryl; R' = hydrogen, alkyl, aryl

Possible catalytic application:

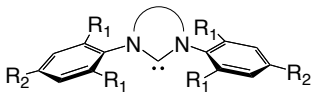


R = H, Alkyl, aryl, OR", $NR"_2$
R' = Alkyl, aryl, OR", $NR"_2$
M = B, Al, Zn, Si, Ti

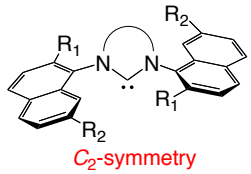
One of our recent research goals is to identify and apply chiral chelating sulfoxides as sulfur-based ligands in late-transition metal chemistry. First results show that these ligands indeed are able to perform well in a conjugate addition reaction catalyzed by Rhodium. The short-term projects available in this area of our research will focus on novel ligand systems and will expand catalytic reactivity to other reactions. For additional information on our research, please consult the following publications: R. Mariz et al., *J. Am. Chem Soc.* **2008**, *130*, 2172; J. J. Bürgi et al., *Angew. Chem. Int. Ed.* **2009**, *48*, 2768; R. Mariz et al., *Chem. Eur. J.* **2010**, *16*, 14335; G. Sipos et al., *Chem. Soc. Rev.* **2015**, *44*, 3834; G.-Z. Zhao et al., *Adv. Synth. Catal.* **2016**, DOI 10.1002/adsc.201500975.

2. New N-Heterocyclic Carbene Ligands in (Asymmetric) Catalysis

Successful NHC ligands



Proposed Chiral NHC ligands



In the last few years, we have initiated a research program that proposes the synthesis of new classes of monodentate, chiral NHCs that incorporate substituted naphthyl sidechains on the nitrogen atoms. In doing so, we are indirectly relying on a very successful design motif in chiral ligand synthesis that goes back to Noyori's bis-phosphine ligand BINAP. These new types of ligand systems allow for the synthesis of new transition metal complexes, where our focus lies on the isolation of highly unsaturated precatalysts. Current emphasis in applications is put on the identification of more active chiral rhodium and iridium NHC compounds in catalysis. For some previous data from our group on this project, see: X. Luan et al., *J. Am. Chem. Soc.* **2008**, *130*, 6848; X. Luan et al., *Org. Lett.* **2008**, *10*, 5569; M. Gatti et al., *J. Am. Chem. Soc.* **2009**, *131*, 9498; M. Gatti et al., *J. Am. Chem. Soc.* **2010**, *132*, 15179; X. Luan et al., *Org. Lett.* **2010**, *12*, 1912: L. Wu et al., *Angew. Chem. Int Ed.* **2012**, *51*, 2870.