

### **Functionalized N-Heterocyclic Carbene Complexes in Asymmetric Catalysis**

Organometallic chemistry lies at the interface of organic and inorganic chemistry and many of these complexes have been used as synthetic tools in organic synthesis. Work in the Homogeneous Catalysis Lab is directed at developing novel catalysts to enable clean and selective transformations and achieving efficient synthesis of novel bioactive molecules for application as drugs and agrochemicals.

This research project will be focussed on the development of novel, chiral functionalized N-heterocyclic carbenes (NHCs). In the last few years NHCs have begun to play an increasingly prominent role as ligands in many catalyzed processes. However, the use of chiral NHCs as ligands for asymmetric metal-mediated processes is still in its infancy. Recently, we have synthesized the first chiral cyclopentadienyl-functionalized NHC ligand (Cp-NHC) and we have studied its coordination to Iridium and Molybdenum (part of this work has been published in *Organometallics*, 2008, 27, 1305; *Dalton Trans.* 2009, in press). We are now extending our studies in preparing novel metal complexes containing this new ligand and evaluating their potential in asymmetric processes.

Students will have the opportunity to learn to perform synthesis of some organic and organometallic compounds (using Schlenk techniques, vacuum lines and dry-box), to characterize new complexes by using different techniques (*eg.* NMR spectroscopy, IR, elemental analysis, mass spectrometry) and to perform catalytic experiments (catalytic runs will be monitored by chromatography, using a GC Trace 200 Series).

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