Research Projects  
with Professor Johnson, Summer 2017

Organometallic synthesis and asymmetric catalysis. My group studies the asymmetric hydroamination of aminoallenes with chiral titanium and tantalum catalysts. Our new ligands are designed to be improvements from our previously published ones from my research group. The project would involve synthesis of a ligand in two or three steps from commercially available chiral building blocks, followed by complexation of that ligand with a transition metal. You will gain experience on NMR spectroscopy, GC-MS, air-sensitive reaction chemistry and the use of a glove box. Current targets are shown below.

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R = \text{CH}_3 \text{ or C}_6\text{H}_3
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Catalytic hydroamination. Titanium (and tantalum) complexes catalyze the intramolecular hydroamination (addition of an N-H bond across a C-C multiple bond) of 1,3-aminoallenes as shown here. Our complexes form product 1 in high yield (100% when R’ = Me), and the enantiomeric excess is low (ca. 16%) for Ti, but much higher (ca. 75%) for Ta. We test all new complexes and substrates in the hydroamination reaction.

X-ray Crystallography: In long-term partnership with two X-ray crystallography groups, we have structurally characterized our amino alcohol ligands and their Ti and Ta complexes. A recent Crystal structure is shown here.

For more information, read these papers:

*J. Chem. Crystallogr.,* 2012, 42, 790-792 (http://dx.doi.org/10.1007/s10870-012-0315-8)

*Organometallics,* 2011, 30, 4616-4623 (http://dx.doi.org/10.1021/om200446v)

*J. Organometal. Chem.,* 2011, 696, 81-86 (http://dx.doi.org/10.1016/j.jorganchem.2010.08.001)


*Organometallics,* 2004, 23, 4614-4620 (http://dx.doi.org/10.1021/om049564s)