

Stereoselective Functionalization of Unsaturated Hydrocarbons

The selective functionalization of C-H bonds has revolutionized the chemical synthesis of complex molecules. Most strategies are based on metal-catalyzed C-H activation and C-H insertion processes. The Tambar Group is interested in developing a conceptually distinct approach to C-H functionalization that is based on selective pericyclic reactions. We are studying catalytic stereoselective reactions for the functionalization of unsaturated hydrocarbons. We have developed a catalytic enantioselective allylic amination of unactivated alkenes via a [2,3]-rearrangement. In this method, a diimido-sulfur reagent serves as the source of nitrogen, and it reacts selectively with terminal alkenes through a hetero-ene reaction. The resulting ene adduct undergoes a Pd-catalyzed enantioselective [2,3]-rearrangement to generate chiral amines in high enantiomeric excess. Based on this chemistry, we have developed a copper-catalyzed enantioselective allylic alkylation of unactivated alkenes with Grignard reagents to generate internal alkenes with high regioselectivity and *E*-selectivity. We have also discovered regioselective and diastereoselective aminoarylations and aminothioliations of 1,3-dienes with Grignard reagents that are based on a selective [4+2] cycloaddition. These results represent a general strategy for functionalizing unsaturated hydrocarbons with aromatic, aliphatic, and vinyl Grignard reagents. As an extension of our approach to the catalytic allylic functionalization of unactivated terminal alkenes, we recently pursued the more challenging problem of catalytic asymmetric allylic functionalization of *internal* alkenes. We have developed an enantioselective, regioselective, and *E/Z* selective allylic oxidation of unactivated internal alkenes via a catalytic asymmetric hetero-ene reaction with an imido-sulfur oxidant.

References:

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