University of Minnesota
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Department of Chemistry

Aldrich Seminar in Synthetic Organic Chemistry

9:45 a.m. Tuesday, Nov. 17, 331 Smith Hall

Associate Professor

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Stereospecific, Nickel-Catalyzed Cross Couplings of Alcohol- and Amine-Derived Electrophiles

Research focuses on the discovery of new methods for organic synthesis; particularly utilizing transition metal catalysts to develop novel transformations and enantioselective reactions. The goal is to enable greater efficiency and novel bond constructions in the synthesis of stereochemically complex molecules.

Website: http://www.udel.edu/chem/mpwatson/mpwatson/index.html

Abstract

Transition metal-catalyzed cross coupling reactions have revolutionized organic synthesis, particularly the construction of bonds to sp^2-hybridized carbons. However, the discovery of analogous reactions of $C_{sp}3$ electrophiles have lagged behind, despite their potential to deliver a range of important targets, including chiral molecules in high enantiopurity. In particular, di- and tri-aryl alkanes are important molecules in organic synthesis and pharmaceutical development. Stereospecific cross couplings of benzylic electrophiles with organometallic reagents provide a highly efficient and powerful route to these molecules, particularly if the benzylic electrophiles can be prepared in exceptional enantiopurity. To this end, we have developed stereospecific, nickel-catalyzed cross couplings of both benzylic amine and benzylic alcohol derivatives. These reactions proceed with high levels of stereochemical fidelity; employ air-stable, functional group tolerance coupling partners, such as aryl boronic acids; and display excellent functional group tolerance. This strategy is also effective for the arylation of allylic electrophiles, and the use of alternative coupling partners. The optimization, scope, and mechanistic studies of these reactions will be presented.

Host: Professor Christopher Douglas