Nickel-Catalyzed Cross-Coupling of Tertiary Alkyl Sulfones

Alkyl sulfones represent a unique class of compounds with enormous potential for a broad range of chemical transformations. While their use as Csp^2 electrophiles in cross-coupling reactions dates to the early 1970’s, their potential as competent Csp^3 electrophiles has not been recognized until recently. Our group has made significant contributions to the development of new cross-coupling methodologies utilizing alkyl sulfones as electrophiles. In this seminar we will discuss the development of nickel-catalyzed cross-coupling methodologies using tertiary alkyl sulfones as electrophiles. The first part will describe the desulfonylative Suzuki-Miyaura cross-coupling of tertiary benzylic and allylic sulfones to prepare a variety of quaternary products. The major drawback of this chemistry is the requirement of π-extended aromatics commonly known as “the naphtalene problem”. In the second part, we will describe our strategy to overcome this problem by designing new tertiary benzylic sulfones that are competent electrophiles in the desulfonylative Suzuki-Miyaura cross-coupling reaction. We will highlight the functionalization of the quaternary products following cross-coupling and the unique mechanism of oxidative addition.