

CBC SEMINAR ANNOUNCEMENT



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Challenges in Organic Chemistry: Direct Transformation of Inert C-X Bonds

Our researches were focused on the development of efficient and economic synthetic methodologies as well as understanding the intrinsic properties of the inert bonds to meet the requirement of green and sustainable development.

Due to their easily availability and inert reactivity, direct application of O-containing fine chemicals is highly appealed but challenging. Our first aim is to investigate the reactivity of C-O bonds to understand their intrinsic feature as well as make them potentially applicable in synthesis. We first performed direct methylation of aryl- sp^2 and benzyl sp^3 C-O bonds with MeMgX in high efficiency. By altering the phosphine ligand, these two kinds of C-O bonds could be differentiated and functionalized stepwise. With this developed system, Suzuki-type coupling was subsequently investigated and succeeded in the presence of EtMgBr. Later on, We first developed various cross couplings with organoboronic, organozinc and Grignard reagents based on C-O activation of aryl/alkenyl carboxylates *via* Ni or Fe catalysis. These studies were highlighted as "a possible breakthrough" at *Angew Chem*. Moreover, cross couplings were also developed directly between phenolates and Grignard reagents or organoboronic reagents, which showed great potential for direct application of phenol in cross couplings. These results not only offered new strategies to construct useful motifs, but also opened new windows for understanding the features of inert C-O bonds.

C-H activation is a hot topic in chemistry community, which offers green and sustainable methodologies to construct the diverse organic molecules. In our studies, directing group oriented strategy was first considered to approach regioselective C-H activation and further substrate scopes were extended to heterocycles and general arenes. Starting from C-Hs, highly selective halogenations, Suzuki-type coupling, Hiyama-type Coupling, Kumada-type Coupling, Tsuji-Trost-type alkylation, and even Cross Dehydrogenative Arylation (CDA) from two arenes were developed. Later on, benzylic and allylic C-H Activation was also conducted to construct C-C bonds. In the aspect of developing catalytic systems, we have developed the late and noble transition metal catalysis (Pd, Ir, etc), normal transition metal catalysis (Co, Fe, Nb, Mo, etc) and even transition-metal free process for direct C-H transformations. Very recently, we have reported the first successful example to approach the direct addition of aryl C-H to C=O/N as the Grignard reagent surrogates.

Keywords: Activation, C-H Bond, C-O Bond, Catalysis

Date:	8th August 2012 (Wednesday)
Time:	10:00am – 11:00am
Venue:	NTU SPMS CBC Building Level 2, Conference Room
Host:	Assoc Professor Tan Choon Hong