Université de Montréal, Montréal, QC, Canada

THIRD INTERNATIONAL SYMPOSIUM
ON C–H ACTIVATION

May 30 – June 2, 2016

OR14 – Cobalt Catalyzed C–H Bond Functionalization

Malay Sen, Nagaraju Barsu, Deepti Kalsi and Basker Sundararaju*

Department of Chemistry, Indian Institute of Technology Kanpur, Kanpur, Uttar Prasesh, India

E-mail: basker@iitk.ac.in

Transition-metal-catalyzed C–H functionalizations has greatly complimented to traditional organic synthesis that involves atom and step saving processes with high functional group compatibility.[1] Yet most of the known C–H functionalization was carried out using noble late transition metals, which are very expensive and hence transformation from academia to industry is very unlikely. Due to fast depletion of noble metals and cost efficiency, we need an alternative catalyst that are low cost, earth abundant and match or surpass the activity of noble metals. Certainly cobalt be the first choice, due to above mentioned factors and in addition, it possess variable oxidation state and hence it may have unique reactivity than its second row and third row counter parts.[2]

Figure 1: Co(III)–catalyzed C–H bond functionalization

In this lecture we disclose some of our recent results on C–H bond functionalization using air stable, low cost, versatile cobalt (III) catalyst for C–H bond functionalization. We will discuss in detail C–H bond annulation, sequential C–H activation/oxygen atom transfer, and C–H bond allylation, etc. Our preliminary experiments on mechanistic investigation and DFT calculations suggest that C–H activation proceed through an inner sphere mechanism and oxygen atom transfer will be the rate determining step.[3]

References

1. Colby, D. A.; Bergman, R. G.; Ellman, J. A. *Chem. Rev*. **2010**, *110*, 624-655; (b) Arockiam, P. B.; Bruneau, C.; Dixneuf, P. H. *Chem. Rev.* **2012**, *112*, 5879-5918; (c) Wencel-Delord, J.; Glorius, F. *Nat. Chem*. **2013**, *5*, 369-374.
2. (a) Tasker, S. Z.; Standley, E. A.; Jamison, T. F.; *Nature*, **2014**, *509*, 299-309; (b) Bauer, I.; Knölker, H. J.; *Chem. Rev*. **2015**, *115*, 3170-3387; (c) Yoshikai, N.; *ChemCatChem*. **2015**, *7*, 732-734; (d) Moselage, M.; Li, J.; Ackermann, L.; *ACS Catal*. **2016**, *6*, 498-525.
3. (a) M. Sen, N. Barsu, B. Sundararaju, *Chem. Eur. J.* **2015**, *21*, 15529-15533; (b) D. Kalsi, B. Sundararaju, *Org. Lett.* **2015**, *17*, 6118-6121; (c) N. Barsu, M. Sen, J. Richard Premkumar, B. Sundararaju, *Chem. Commun*., **2016**, *52*, 1338-1341; (d) M. Sen, B. Emayavaramban, N. Barsu, J. Richard Premkumar, B. Sundararaju, ACS Catal, **2016**, *6*, 2792-2796.