

Ph.D. Open Seminar

Speaker: Virendra K. Tiwari (Thesis Adviser: Dr. M. Kapur)

Title of Seminar: Transition Metal Catalyzed Regiodivergent C-H Functionalization of Nitrogen Heterocycles

Time: 5:00 PM

Date: 8th April 2016

Venue: L-1

Abstract: Owing to the ubiquity of C–H bonds in organic compounds, the transition metal catalyzed direct functionalization of C-H bonds has a broad synthetic potential and is an extremely challenging topic in modern organic synthesis.¹ Nitrogen heterocycles are omnipresent motifs in drug molecules and natural products like alkaloids and have great pharmaceutical and biological importance. C-H functionalization reactions typically require fewer steps and therefore use less solvent and produce fewer chemical wastes compared with ‘classical’ cross-coupling processes.² In the C-H functionalization of electron deficient heterocycles, there remains a major, largely unmet challenge, *viz.*, controlled selectivity for the C-H activation. This is despite the recent developments in transition metal-catalyzed C-H functionalization reactions which increase selectivity at a ‘natural’ site of reactivity. But this is unsatisfactory – what if we want to functionalize a different position or at more than one site in a predictable sequence? How do we go about ‘switching’ the reactive site at will, in a predictable manner? In the present work we have successfully achieved the C-H functionalization in electron-rich as well as electron-deficient heterocycles, in a regiodivergent fashion and switched the reactivity and selectivity by tweaking the reaction conditions.³

References:

1. Shilov, A. E.; Shul’pin, G. B. *Chem. Rev.* **1997**, *97*, 2879.
2. (a) Labinger, J. A.; Bercaw, J. E. *Nature* **2002**, *417*, 507. (b) Guo, X.-X.; Gu, D.-W.; Wu, Z.; Zhang, W. *Chem. Rev.* **2015**, *115*, 1622.
3. (a) Tiwari, V. K.; Pawar, G. G.; Das, R.; Adhikary, A.; Kapur, M. *Org. Lett.* **2013**, *15*, 3310. (b) Pawar, G. G.; Singh, G.; Tiwari, V. K.; Kapur, M. *Adv. Synth. Catal.* **2013**, *355*, 2185. (c) Tiwari, V. K.; Pawar, G. G.; Jena, H. K.; Kapur, M. *Chem. Commun.* **2014**, *50*, 7322. (d) Pawar, G. G.; Tiwari, V. K.; Jena, H. K.; Kapur, M. *Chem. -Eur. J.* **2015**, *21*, 9905. (e) Tiwari, V. K.; Kamal, N.; Kapur, M. *Org. Lett.* **2015**, *17*, 1766. (f) Tiwari, V. K.; Kamal, N.; Kapur, M. (*Submitted*)