

Innovative Pathways to Diverse Nitrogen Heterocycles via Transition-metal mediated C-H Functionalization

Manmohan Kapur*

Department Chemistry, Indian Institute of Science Education and Research Bhopal, MP, India

(E-mail: mk@iiserb.ac.in)

Abstract:

Selectivity plays a pivotal role in organic synthesis. When multiple outcomes are possible under a single reaction condition, favoring one of them exclusively, via control of chemo-, regio- or stereoselectivity forms the very basis of synthesis. Controlling site-selectivity is a primary concern in C-H activation and subsequent functionalization, simply due to the fact that several C-H bonds exist in the substrate that possess the same bond dissociation energies as well as chemical environment.¹ Innate reactivity is often invoked for site-selectivity in electronically biased systems. In other substrates, the most preferred route is the deployment of Lewis-basic directing groups. The outcome and efficiency of the transformation is then dependent on the coordination ability of the directing group. It is quite likely that the two approaches would also differ in the mechanism adopted for C-H activation. Our group has been interested in the C-H functionalization and synthesis of *N*-heterocycles and we have adopted two very different approaches for controlling site-selectivity in the C-H activation step.² Utilizing these methodologies, we have synthesized a variety of densely functionalized *N*-heterocycles. We have also attempted to explain the outcomes in terms of the mode of C-H functionalization. This talk shall focus on some of these aspects and the applications of these methodologies in the synthesis of alkaloid frameworks.

References and Notes:

1. (a) Labinger, J. A.; Bercaw, J. E. *Nature*, **2002**, *417*, 507-514. For special issues dedicated to C-H activation and functionalization, see: (b) Crabtree, R. H. *Chem. Rev.* **2010**, *110*, 575-575. (c) Gladysz, J. A. *Chem. Rev.* **2011**, *111*, 1167-1169. (d) Beller, M. *Chem. Soc. Rev.* **2011**, *40*, 4891-4892. (e) Yu, J.-Q. *Adv. Synth. Catal.* **2014**, *356*, 1393-1393.
2. (a) Tiwari, V. K.; Kamal, N.; Kapur, M. *Org. Lett.* **2015**, *17*, 1766-1769. (b) Kale, A. P.; Kumar, G. S.; Arun Raj, K. M.; Kapur, M. *Org. Lett.* **2015**, *17*, 1324-1327. (c) Kumar, G. S.; Kapur, M. *Org. Lett.* **2016**, *18*, 1112-1115. (d) Das, R.; Kapur, M. *Chem. -Eur. J.* **2016**, *22*, 16986-16990. (e) Tiwari, V. K.; Kamal, N.; Kapur, M. *Org. Lett.* **2017**, *19*, 0000 (10.1021/acs.orglett.6b03558).