Functionalization of π-Excessive Nitrogen Heterocycles and their Application in the Total Synthesis of Alkaloids

Dr. Modhu Sudan Maji, Associate Professor
Department of Chemistry, Indian Institute of Technology Kharagpur, Kharagpur-721320
(E-mail: *msm@chem.iitkgp.ac.in;* ***Web:*** *www.msmlabiitkgp.com*)

About 60% of the marketed drugs are directly or indirectly derived from natural products, and nearly 80% of the natural product derived drugs required synthetic efforts due to the scarcity in their availability. In addition, natural products play a pivotal role as the guiding principle behind drug design and development. Synthesis of complex natural products, drugs, medicinally important compounds and organic-materials are heavily reliant on the availability of sustainable reaction methods. Designing a new reaction often allow the synthesis of much complex molecules in a rather simpler way and also reduces both cost and efforts. The syntheses of over 40 natural products of medicinal importance were accomplished in fewer synthetic steps by inventing novel reaction methods such as organo-catalytic alkenylation, alkylation, cationic cyclization reactions of indoles and Brønsted acid catalyzed annulation of 2-alkenyl indoles.[1-7] Use of simple and cost-effective catalysts, easy reaction set-up and cheap starting materials are major highlights and render these methods sustainable for large scale application.

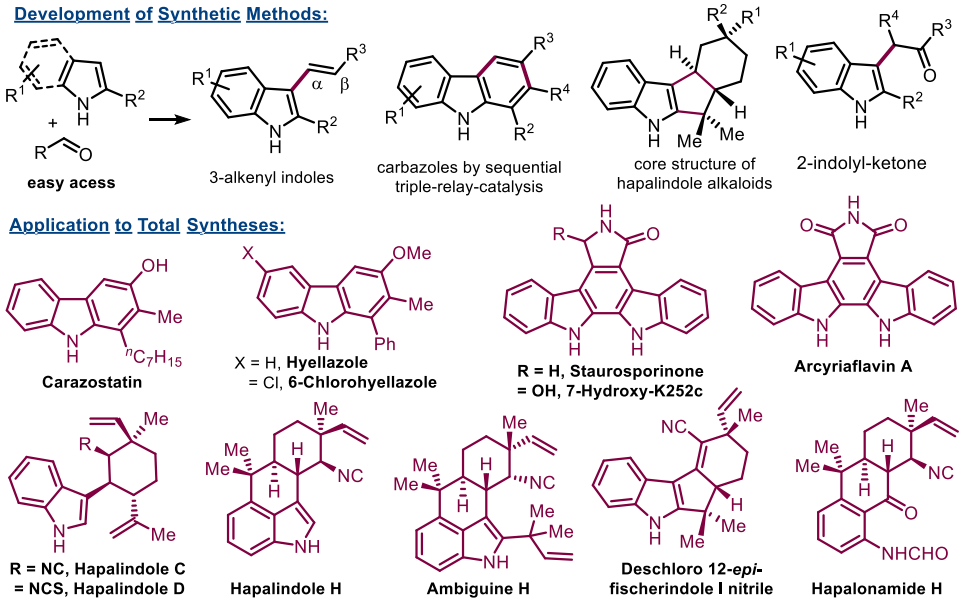

Figure 1. Functionalizations of indole and pyrrole.

References: [1] S. Sahu, A. Banerjee, M. S. Maji, *Org. Lett.* **2017**, *19*, 464; [2] A. Banerjee, S. Sahu, M. S. Maji, *Adv. Synth. Catal.* **2017**, *359*, 1860; [3] S. Sahu, B. Das, M. S. Maji, *Org. Lett.* **2018**, *20*, 6485; [4] S. Saha, A. Banerjee, M. S. Maji, *Org. Lett.* **2018**, *20*, 6920; [5] M. R. Sk, S. S. Bera, M. S. Maji, *Org. Lett.* **2018**, *20*, 134; [6] A. Banerjee, M. S. Maji, *Chem. Eur. J.* **2019**, 25, 11521; [7] G. Karan, S. Sahu, M. S. Maji, *Chem. Commun.*, **2021**, *57*, 5274; [8] S. Sahu, G. Karan, L. Roy and M. S. Maji, *Chem. Sci.* **2022**, *13*, 2355; [9] A. Banerjee, S. Saha and M. S. Maji, *J. Org. Chem.* **2022**, 87, 4343.