

Ph.D. Colloquium Seminar

Transition-Metal-Catalyzed Directed C–H Activation and Visible-Light-Mediated Atom Transfer Radical
Reaction of Carboxylic Acid Derivatives

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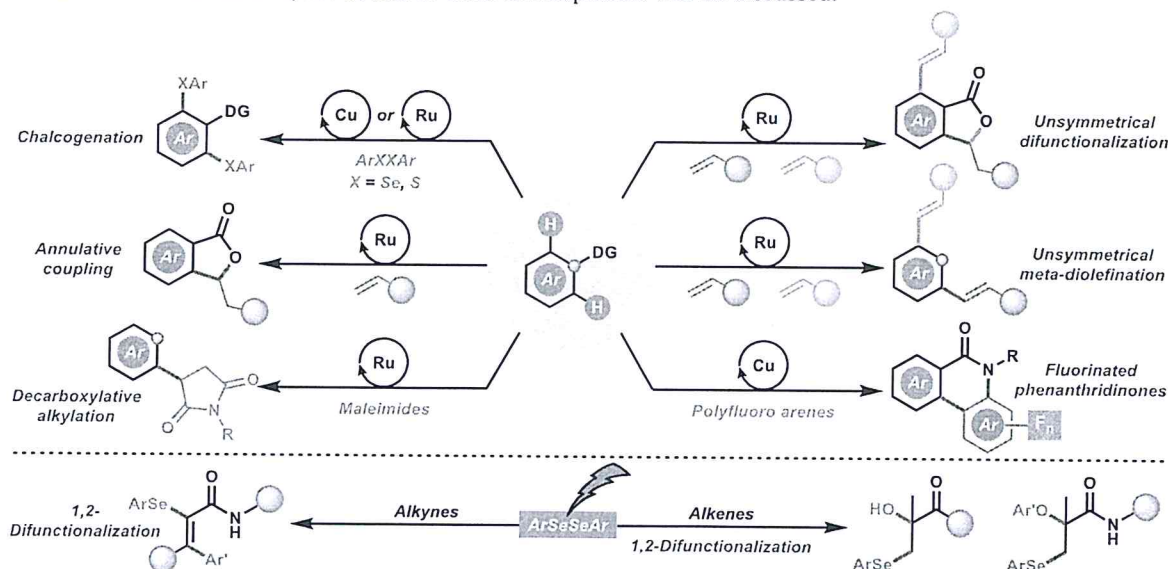
Date: 24.09.19

Guide: Dr. Md. Mahiuddin Baidya

Time: 3.00 pm, Venue: 310

Abstract

Building molecular complexity from simple and easily-accessible precursors is a long-standing goal in synthetic organic chemistry. In this context, transition-metal-catalyzed functionalization of otherwise unactivated C–H bonds is highly alluring. However, owing to the ubiquity of C–H bonds in organic molecules, selective functionalization of a specific C–H bond is highly challenging.¹ One way to overcome this issue is the assistance of directing groups (DGs). Usually, directing groups bear a coordinating moiety to direct the metal catalyst into the proximity of a certain C–H bond in the molecule, leading to its selective cleavage and subsequent functionalization.² In this context, we were interested in developing atom- and step-economic reaction conditions for the production of complex molecular frameworks from small molecules through highly regioselective C–C and C–heteroatom bond formation. Herein, we have developed various carbon–chalcogen bond-forming processes under copper catalysis and ruthenium catalysis.³ We have also established several ruthenium-catalyzed weak carboxylate assisted carbon–carbon bond forming protocols with olefins towards the synthesis of densely functionalized molecules.⁴ A unique concept via hydroarylation of alkenes with concomitant decarboxylation *en route* to formal *meta*- and *para*- functionalization of arenes has also been developed.⁵ An unprecedented synthesis of polyfluorinated phenanthridinones based on copper promoted cross-dehydrogenative annulation of benzamides has been promoted.⁶ Further, visible-light-mediated atom transfer radical reaction has been demonstrated for the 1,2-difunctionalization of alkenes and alkynes with diaryl diselenides. In this seminar, the details of these developments will be discussed.



Scheme 1. Transition-metal-catalyzed C–H bond activation of carboxylic acid derivatives and visible-light-mediated atom transfer radical reaction of alkenes and alkynes.

References

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- (3) (a) Mandal, A.; Sahoo, H.; Baidya, M. *Org. Lett.* **2016**, *18*, 3202; (b) Mandal, A.; Dana, S.; Sahoo, H.; Grandhi, G. S.; Baidya, M. *Org. Lett.* **2017**, *19*, 2430. (4) (a) Mandal, A.; Dana, S.; Chowdhury, D.; Baidya, M. *Asian J. Org. Chem.* **2018**, *7*, 1302; (b) Mandal, A.; Mehta, G.; Dana, S.; Baidya, M. *Org. Lett.* **2019**, *21*, 5879. (5) Mandal, A.; Sahoo, H.; Dana, S.; Baidya, M. *Org. Lett.* **2017**, *19*, 4138. (6) Mandal, A.; Selvakumar, J.; Dana, S.; Mukherjee, U.; Baidya, M. *Chem. Eur. J.* **2018**, *24*, 3448.

Guide

Seminar Coordinator
19.09.19.

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