

Title: *Bridging Catalysis to Medicinal Chemistry and Chemical Biology: A Journey of Innovation and Discovery*

Abstract: Catalytic reactions provide an excellent opportunity for the advent and efficient access to diverse chemical matters such as new medicines, materials, and agrochemicals. Moreover, combining catalysis with medicinal chemistry, and chemical biology represents a dynamic frontier in modern scientific discovery, offering a pathway toward developing transformative therapeutics and molecular tools. In this seminar, I will talk about the intricate interplay between catalysis and the realms of medicinal chemistry and chemical biology. In the first part, I will provide an overview of my research experiences in (a) synthetic organic chemistry (cooperative asymmetric catalysis involving NHC-organocatalysis & transition metal catalysis,^[1] and asymmetric metal carbenoid chemistry^[2]), (b) chemical biology (bifunctional molecules induced phosphorylation of a protein of interest^[3]), and (c) medicinal chemistry (high-throughput experimentation (HTE) and direct-to-biology (D2B) technique for rapid optimization of novel cancer inhibitors^[4]) during my Ph.D. and postdoctoral research work. In the second part of my presentation, I will present how the knowledge and experiences gained during my Ph.D. and postdoc could be applied to my future research plan which includes: (a) development of new drug diversification methods (such as new methods for enantioselective C(sp³)-C(sp³) cross-coupling, new methods for saturated bioisostere syntheses, late-stage hydrogenation (LSH) of drug molecules) to improve efficiency and selectivity of drug molecules, (b) development of site-selective protein labeling methods based on novel catalytic reactions.

Reference: [1] a) *J. Am. Chem. Soc.* **2018**, *140*, 3551; b) *Nat. Catal.* **2020**, *3*, 48. [2] a) *J. Am. Chem. Soc.* **2021**, *143*, 5666; b) *Angew. Chem. Int. Ed.* **2022**, *61*, e202212546. [3] *ACS Cent. Sci.* **2023**, *9*, 1558. [4] *Work in progress.*