

UniSysCat - Colloquium

Prof. Huimin Zhao

University of Illinois at Urbana-Champaign

Start Time: Thursday, June 9, 2022 05:00 pm

End Time: Thursday, June 9, 2022 06:00 pm

TC 006
and via Zoom

Expanding the Boundary of Biocatalysis

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Biocatalysis has been increasingly used for practical synthesis of chemicals, fuels, and materials thanks to recent advances in synthetic biology and enzyme engineering. In this talk, I will discuss our recent effort in designing novel synthetic routes and repurposed enzymes for synthesis of fine chemicals by exploring the synergy between enzymatic catalysis and non-enzymatic catalysis. Specifically, I will highlight our new strategies of combining photocatalysis with biocatalysis for abiological transformations, which offer many advantages such as new reactivity, high enantioselectivity, greener syntheses, and high yields. In addition, I will highlight the development of machine learning and laboratory automation tools for enzyme discovery and engineering. These strategies and tools should greatly accelerate the development of biocatalysts for applications related to sustainability.

C. A. Denard, J.F. Hartwig, and H. Zhao. "Multistep One-pot Reactions Combining Biocatalysts and Chemical Catalysts for Asymmetric Synthesis." ACS Catalysis, 3, 2856–2864 (2013)

Z. Litman, Y. Wang, H. Zhao, and J. F. Hartwig. "Cooperative Asymmetric Reactions Combining Photocatalysis and Enzymatic Catalysis." Nature, 560, 355–359 (2018)

X. Huang, B. Wang, Y. Wang, G. Jiang, J. Feng, and H. Zhao. "Photoenzymatic Enantioselective Intermolecular Radical Hydroalkylation." Nature, 584, 69–74 (2020).

W. Harrison, X. Huang, H. Zhao. "Photobiocatalysis for Abiological Transformation." Accounts of Chemical Research, 55, 1087–1096 (2022).

X. Huang, J. Feng, J. Cui, G. Jiang, W. Harrison, X. Zang, J. Zhou, B. Wang, and H. Zhao. "Photoinduced Chemomimetic Biocatalysis for Enantioselective Intermolecular Radical Conjugated Addition." Nature Catalysis, DOI: 10.1038/s41929-022-00777-4 (2022)

Prof. Dr. Roderich D. Süßmuth

Organizer