

Twists and turns around the path of my research in the field of catalysis

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Catalysis is essential for the development of a sustainable world and is a key technology in achieving sustainable development goals in a broad range of sectors, products, and processes. My research interest focuses on developing new catalysts (transition metal based-, photoredox- and organo- catalysts) and investigating its activity to make feedstock chemicals, natural products/derivatives and bioactive molecules.

I started my research career by working on the design and synthesis of chiral transition metal complexes with multi-framework ligands for catalytic asymmetric transformations. Several practical methodologies were developed to access both natural and unnatural chiral amino alcohols and amino acids. Later, I have also acquired knowledge in the field of photocatalysis and developed the catalytic photoredox processes for alkene difunctionalization reactions. Interestingly, we have disclosed a novel stepwise radical cyclopropanation and carbobromination of unactivated alkenes, under catalytic photoredox conditions with visible-light blue LED, by harnessing an O_2/I_2 couple as an electron shuttle system. Recently, I am engaged in organocatalysis - the third pillar of catalysis. Here, I am utilizing the isothioureia catalyst and developing the acylative dynamic kinetic resolution process for the synthesis of natural products and bioactive molecules.

Apart from this, I have also developed catalytic approach to utilize the abundantly available carbon dioxide to prepare value-added compounds.