

EVOLVING THE ENZYME THROUGH LOOP ENGINEERING

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A plenty of enzymes catalyzing different kinds of reactions are widely used in many areas, and their usage will continue to increase due to their proficient efficiencies and environmental issues compared to human-made catalysts. Nonetheless, enzymes have some drawbacks to be addressed for practical applications, and many approaches have been developed and implemented to design enzymes with desired properties. Based on the structural analysis of more than 80,000 proteins, it is supposed that nature made use of a limited repertoire of scaffolds (~ a few thousands), creating an amazingly large diversity of functions. From the evolution processes of enzymes in nature, diversity in enzyme functions is likely to be executed through the insertion and /or deletion of active-site loops, while the basic scaffold and key catalytic residues are retained. In my lab, we have been working on the design of enzymes with improved capacity using various methods. In this talk, I will introduce some examples showing how we could evolve enzymes through engineering of active-site loops.