

## **Development of a microfluidic approach for extremely high throughput screening of biocatalysts**

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This project is to develop a microfluidic system for biocatalyst discovery based on screening libraries of novel enzymes rapidly. This approach is entirely in vitro using microfluidic technology to screen the protein library and molecular biology to generate and characterize the new enzymes. The system will enable one to identify enzymes with new functions and to determine the molecular structure of those molecules. The core technology is structured around microfluidic droplet-manipulating devices where the droplets function as bioreactors. To accomplish the research goal, microfluidic devices will be built using existing microfluidic technology capable of extremely high-throughput screening of protein mutants, and linkages of each protein molecules and their coding DNAs will be developed to ensure the genotype-phenotype linkage. Beyond the research goal this technology can be further applied to the development of novel catalysts, the study of interactions of proteins-proteins and proteins-small molecules. The PhD candidate will design and fabricate a microfluidic device to manipulate protein molecules and to assess the chemical activity using optical measurements.