TREASUREDROP – ENZYME ENGINEERING FOR APPLIED BIOCATALYSIS USING MICROFLUIDICS

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Enzymes have established as a new class of catalysts in the field of modern synthetic chemistry. Engineering is arguable the most promising approach to generate desired catalytic activities and its success directly correlates with the library size that can be screened. One of the most powerful technologies enabling the quick and cost-effective testing of millions of enzyme variants is the recently introduced microfluidic droplet-based screening. Interestingly, even though numerous publications highlight its potential, an unambiguous evidence of its ability to provide synthetically relevant biocatalysts still needs to be furnished. We present the engineering of an alcohol dehydrogenase for the challenging enantioselective reduction of a prochiral ketone targeting an important key building block for biologically active compounds. The final aim is not only to obtain an improved variant which allows to perform the selected biotransformation efficiently, but also a comparison of varying evolution paths.
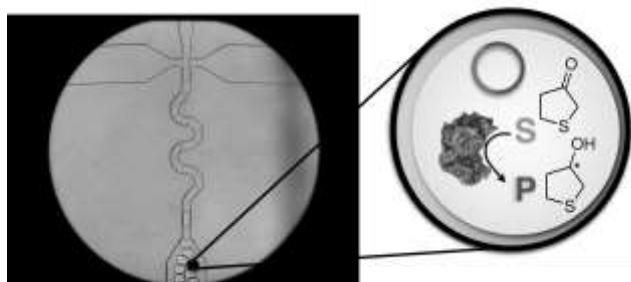
Directed evolution & semi-rational design of an ADH using ultra high-throughput droplet-based microfluidic screening of single cells.

Figure 1 – droplet generation & detected enzymatic reaction in droplets