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Re: Recruiting Nature's most powerful tool to make better catalysts

PhD project: Genetic selection of nanocatalysts

Homogeneous catalysts are crucial tools in the flexible toolbox of modern chemistry, but our capacity to optimize them is limited to the synthetic methods that vary ligand design.
Biocatalysts (enzymes) are limited in chemical scope, yet Nature endows them with rarely paralleled efficiency, precision and stability.
The crucial difference is Nature applies its most powerful tool of optimization, evolution – i.e. the interplay of diversification and selection – to improve biocatalysts.

In the present project, three leading groups from the fields of bioengineering, metalloenzymes, and bioanalytics will join forces to establish an evolution method for catalytic conversion of renewable resources. We will apply state of the art synthetic biology methods and cutting edge microfluidics and mass spectrometry to develop high-throughput analytics of artificial metalloenzymes based on the biotin-streptavidin technology.

We are looking for a highly motivated, talented and qualified PhD student with a background (MSc, diploma or equivalent) in (bio)chemistry or molecular biotechnology. The student will be part of the enzyme evolution team at the Bioprocess Laboratory and closely collaborate with the Artificial Metalloenzyme and the Bioanalytics groups, which are all situated on the Rosental site in Basel.

The Bioprocess Laboratory is part of the recently founded Department of Biosystems Science and Engineering (D-BSSE) of the ETH Zurich. The D-BSSE is an ambitious recent endeavor of one of Europe's premier research universities in shaping the future of life science research. It aims at exploring and exploiting novel interdisciplinary opportunities at the interface of molecular biosciences, systems science, and engineering (www.bsse.ethz.ch).

References

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2. Küster, Pabst, Zenobi & Dittrich. Screening for protein phosphorylation using nanoscale reactions on microdroplet arrays. Angew. Chemie – Interntl Ed. 54:1671 (2015)