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Title: Cell-free Synthetic Biology for the Production of Functional Food Ingredients

Abstract:

Many biotechnology companies are specialized on the use of metabolic engineering to develop designer bugs for the fermentative production of ingredient products for instance for the food and personal care industry. Recent scientific advances in synthetic biology have paved new possibilities and are leading to exciting new high-value products entering the market. On the other hand the efficiency of fermentation processes is sometimes a little bit overrated. Expectations towards product formation rates and product titers are too high and unrealistic. Making use of “metabolic pathways” or better call it multi-enzyme cascade reactions towards new products in a cell-free *in vitro* setup is nowadays becoming a very powerful alternative (“cell-free synthetic biology”). Enzyme Engineering allows to provide enzymes with completely new properties and abilities like coping with very high substrate and product concentrations that are by factors larger than usual titers encountered in fermentation processes. One often used argument against the *in vitro* use of enzymes is the necessity of very expensive cofactors and cosubstrates. But such costs automatically come down with increasing product titers. Smart concepts for cofactor recycling and *in situ* cosubstrate generation help to tremendously increase the process cost efficiency. The talk will exemplify enzyme engineering and synthesis process development work done by c-LEcta on multi-enzyme one-pot synthesis of high-value ingredient products and give an outlook towards the future potential of cell-free synthetic biology.

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