Construction of a simple S-Adenosylmethionine Regeneration System for Preparative Enzyme Catalyzed Methylation

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Project Summary

The third wave of biocatalysis has established the versatility of in vitro reconstituted enzyme cascades for the production of market-relevant organics. Enzymes that catalyze group transfers to and from complex molecules are of particular interest because such reactions are often challenging to achieve by chemical means. For example, S-adenosylmethionine (SAM) dependent methyltransferases (MTs) can methylate natural products with exquisite regio-, chemo- and stereoselectivity. Given the large number of known MTs with defined substrate specificities, the even larger number of putative MTs annotated in todays genome data bases, combined with the increasing possibilities to redesign substrate specificities of enzymes by computational design, it seems possible to engineer biocatalytic solutions for any preparative methylation reaction. Currently the biotechnological application of MTs is limited due to the very high costs of the stoichiometric methyl donor SAM. To mitigate this problem we plan to develop a simple catalytic system for in situ regeneration of SAM.