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Artificial promoters and minimised metabolism for whole cell biocatalysis

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The methylotrophic yeast *Pichia pastoris* is known as efficient host system for the production of recombinant proteins and to grow to very high cell densities. However, only a few examples of its application as whole cell biocatalyst have been reported. Compared to the use of isolated enzymes, whole cell biocatalysts provide endogenous pathways for the regeneration of redox-cofactors, an advantage for reactions catalyzed by oxidoreductases which require cofactors in stoichiometric amounts.

These pathways were engineered to reduce biomass production and methanol assimilation during biotransformations to a minimum. Using artificial promoter variants and codon optimised synthetic reductase genes high level expression was obtained. Reduction of ketones to 2,3 butanediol was used to demonstrate the feasibility and advantages of the studied concept of minimised metabolism for production processes.