TECHNISCHE UNIVERSITÄT DRESDEN

DRESDEN concept

Chair of Bioprocess Engineering

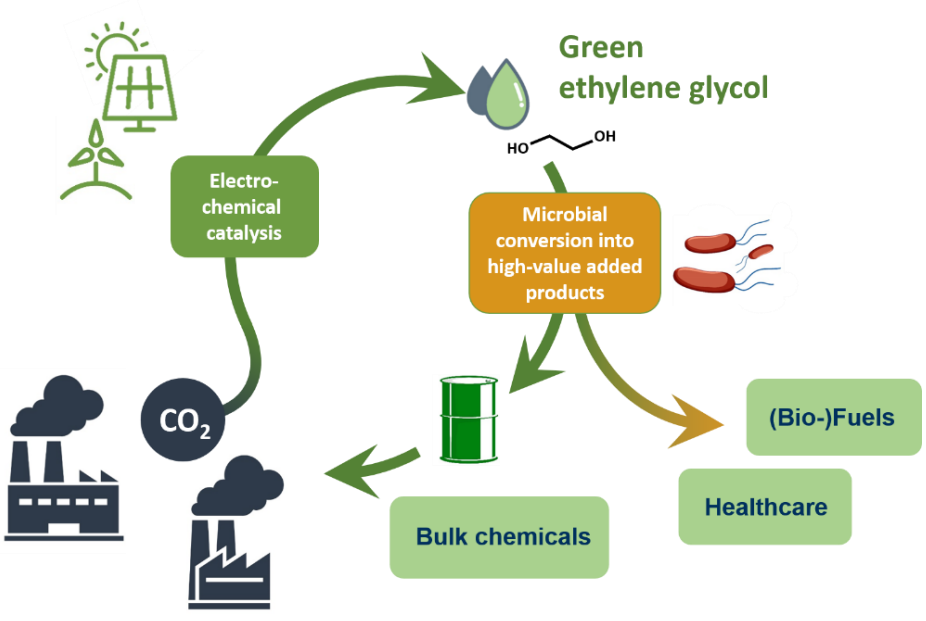
Engineering a synthetic pathway for the carbon-conserving conversion of ethylene glycol into acetyl-CoA-derived chemicals

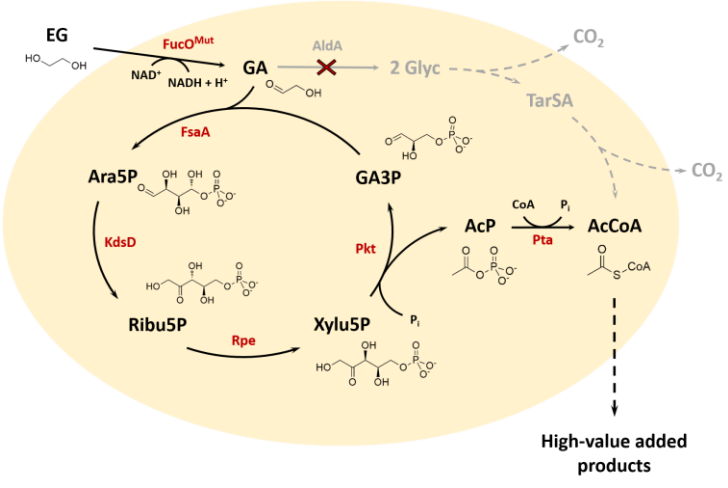
Dipl.-Ing. Nils Wagner

Contact:
nils.wagner@tu-dresden.de
+49 351 463-34272

Motivation

Ethylene glycol as a promising alternative substrate for microbial conversion

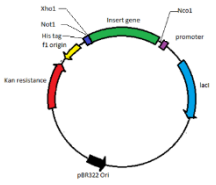


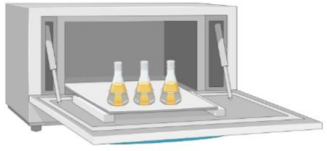


Synthetic pathway for the carbon-conserving conversion of EG into acetyl-CoA-derived products

Applied techniques

Engineering *E. coli* for the assimilation of ethylene glycol



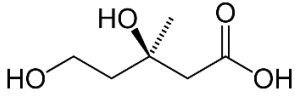


Metabolic engineering

- Plasmid construction
- Strain construction and engineering

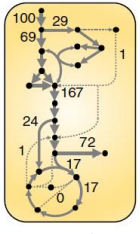
Cultivation

- Strain screening
- Production of model product mevalonate

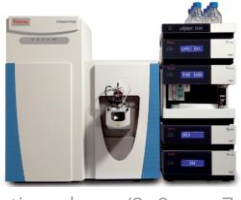


Characterization of synthetic pathway

- Analysis of extra- and intracellular metabolites
- Flux analysis



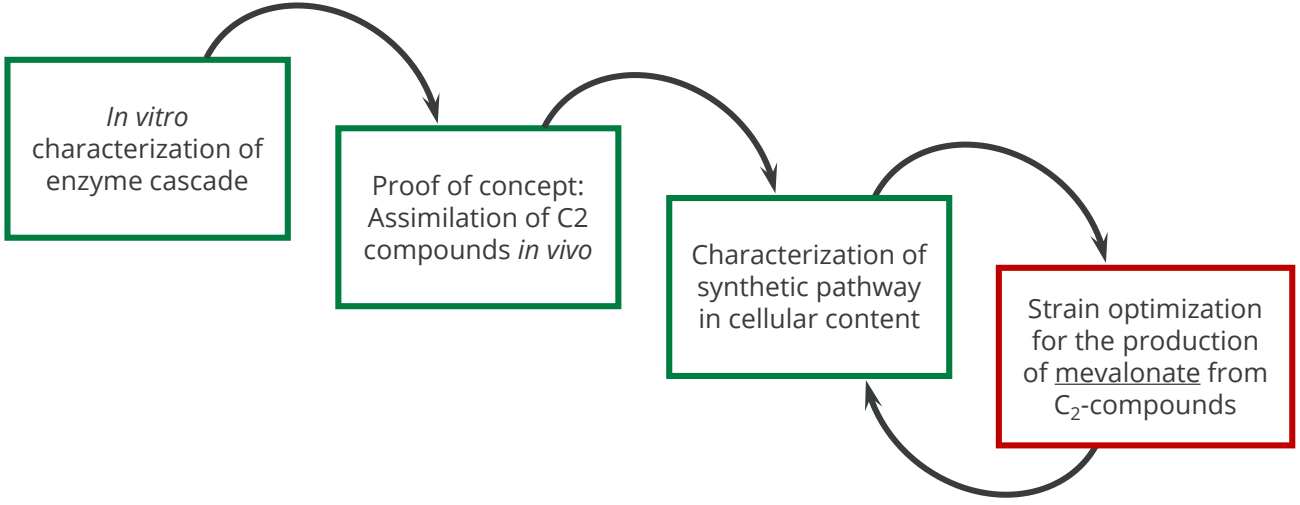
Long and Antoniewicz, 2019



tinyurl.com/2p9eaaw7

State of the project

Engineering *E. coli* for the assimilation of ethylene glycol



- ✓ Suitable enzymes were functional expressed by *E. coli*
- ✓ Function of the synthetic metabolic pathway has been successfully demonstrated both *in vitro* and *in vivo*
- ✓ Engineered *E. coli* strain is able to produce mevalonate from C2 compounds, but so far only in small quantities

- ➢ **Further optimization is necessary**

Student work projects

Engineering *Pseudomonas putida* for the carbon conserving assimilation of EG into acetyl-CoA-derived chemicals

- Transfer of the proposed synthetic pathway into the alternative host *Pseudomonas putida* KT2440
- Combination of molecular and systems biology work packages using ^{13}C analysis
- Master or Diploma thesis

Development and establishment of a method for rapid sampling of intracellular metabolites

- Großer Beleg/ Master or Diploma thesis