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Project term: 2008 –

Financed by: Hamburg University of Technology



Description:

3-Hydroxypropionaldehyde (3-HPA) and 3-Hydroxypropionic acid (3-HP) are potential platform intermediates. They can have a wide range of applications in both large commodity market and new emerging markets (Fig.1). They can be converted to a number of valuable chemicals and materials, including 1,3-propanediol (1,3-PD), acrylic acid, polymers, and many others. 3-HPA also has antimicrobial activities and is used as a food preservative and therapeutic auxiliary agent in food and pharmaceutical industries.

The goal of this research project is to develop efficient processes for microbial production of 3-HPA and 3-HP. Previous work was done for the production of 3-HPA from glycerol (Fig.2). In a fed-batch process 3-HPA can be produced from glycerol with a high product yield (>0.97 mol HPA/mol Glycerol) and relatively high concentration.

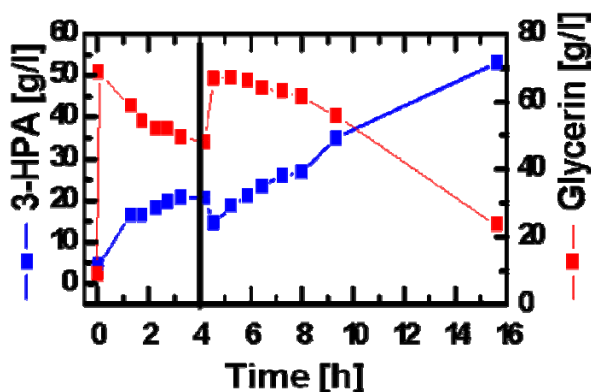


Fig.2. 3-HPA production from glycerol by a fed batch process feeding semicarbazide¹

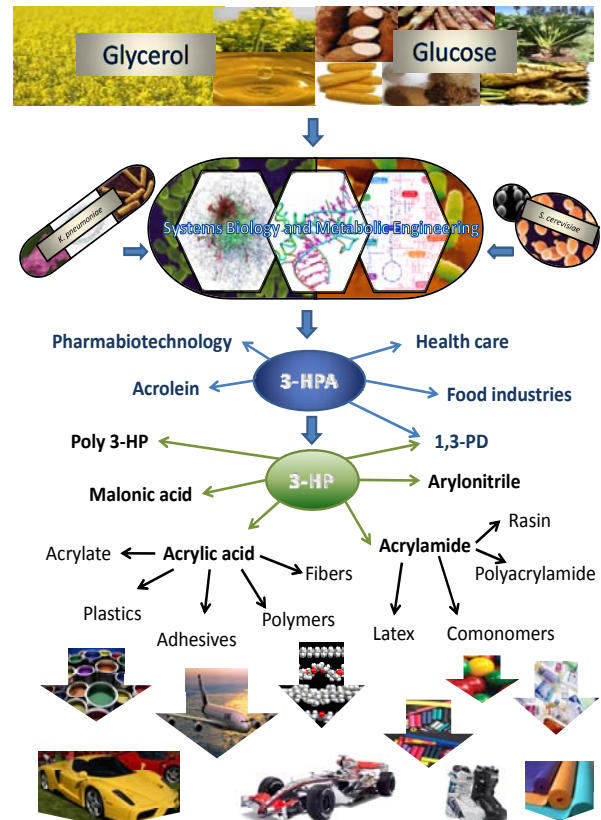


Fig.1. Production of 3-HPA and 3-HP as platform chemicals

Future work will be concentrated on

- Construction of synthetic metabolic pathways and strains
- Optimization of production strains under real fermentation conditions
- Process development including product separation.

References:

1. Ulmer C, Zeng A-P (2007) Chem. Biochem. Eng. Q. 21: 321-326.

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