

Session 1 – Fostering the use of bioprocesses and biocatalysis in traditional industries: lights and shadows

(4 October 2017, 11:30 – 13:00)

Title of presentation:

Syngas fermentation with acetogenic bacteria

Brief of presentation:

Reducing CO₂-emissions is a major demand for industry. A solution may be the gasification of carbon containing residues to synthesis gas (CO₂, CO and H₂) and the subsequent use of the Fischer-Tropsch process to produce liquid hydrocarbons. Syngas fermentation has some overall beneficial aspects compared to the catalysts that are used in the Fischer-Tropsch process: high substrate specificity, tolerance to tar and trace contaminants as well as low operation temperatures. Acetogenic bacteria are able to utilize H₂ and CO₂ or CO as sole carbon and energy sources. The reductive acetyl-CoA pathway enables the autotrophic metabolism of acetogens and the production of C1-, C2-, C4- and C6-chemicals like formate, acetate, ethanol, butyrate, butanol, 2,3-butanediol, hexanoate and hexanol. Metabolic engineering of acetogens is a promising approach to enlarge the product portfolio. Low product yields and selectivities as well as low biomass densities and inefficient utilization of gas substrates are some of the large challenges that prevent commercialization so far. The reaction engineering analyses of (engineered) acetogens and the application of bioreactor designs providing high gas-liquid mass transfer efficiencies will enable new syngas fermentation processes overcoming the challenges for commercialization in the near future.

Brief biography:

Dirk Weuster-Botz studied chemical engineering at the University of Karlsruhe, Germany (diploma 1986) followed by his doctoral research study at the Institute of Biotechnology of the Research Center Jülich, Germany. Since 1991 he was head of the pilot plant facilities at the Research Center Jülich and established his own junior research group on fermentation science. After an industrial research stay (1995 – 1996) at the DSM company in Geleen, Netherlands, he earned his postdoctoral lecture qualification in 1999 at the RWTH Aachen, Germany. One year later he was appointed as full professor and chairman of the newly founded Institute of Biochemical Engineering at the Technical University of Munich (TUM) in Garching. Since 2005 he is Editor-in-Chief of the international journal 'Bioprocess and Biosystems Engineering'. Since 2011 he is chairman of the interfacultative Master's programm 'Industrial Biotechnology' at TUM. 2012 he was appointed as member of the National Academy of Science and Engineering (acatech), Germany.

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