

PhD position in Applied Microbiology

Project titel: **Microbial assisted conversion of brewery waste to renewable energy sources**

Project description: The aim of the project is the development and testing of a scalable and cost-optimized demonstration plant for wastewater treatment of industrial wastewater with simultaneous extraction of the energy source dimethyl ether (DME). The concept is based on the microbial electrolysis of wastewater to obtain H₂ and CO₂, and its conversion to DME in a downstream synthesis stage. The practical operation of the plant with Beck's brewery waste water is intended to demonstrate the stability, cost-effectiveness and sustainability of the process.

The background to the project is the process developed within the framework of the ERWAS funding measure for the energy-efficient production of methanol from wastewater. The core of this concept is a microbial electrolysis cell for the pre-treatment of industrial waste water while simultaneously generating H₂ and CO₂. These product gases are converted in a downstream synthesis stage into methanol as a storable energy carrier and basic material for the chemical industry. As part of the follow-up project BioDME, the process is now to be up-scaled and dimethyl ether (DME) is to be obtained as an economically more attractive product. The principle is shown in Fig. 1.

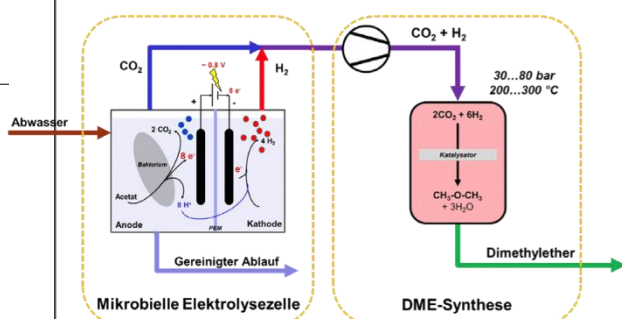


Fig. 1: Schematic representation of the DME synthesis from wastewater. *Left:* Microbial electrolysis cell: Acetate from the wastewater is oxidized to CO₂ by bacteria, releasing protons and electrons. The electrons are conducted to the cathode on the opposite side of a proton membrane and used to produce H₂ gas. CO₂ and H₂ are captured and sent to DME synthesis. *Right:* DME synthesis: CO₂ and H₂ are compressed and converted to DME using a bifunctional mixed catalyst.

Interested applicants are asked to contact Dr. Gunnar Sturm for further details.

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