Methanation reactor technology for the synthesis of biomethane

The exploitation of renewables requires reliable and efficient storage systems to deal with their intermittent availability. Storage through the conversion of carbon dioxide from biogas plants into methane is an option with distinct advantages:

- high flexibility in end-use
- possibility of long-term storage
- generation of high-temperature heat - useful as a source of energy
- full utilization of biogenic carbon dioxide in biogas
- deployment of available natural gas infrastructure

Our team of experts are ready and available to discuss your requirements!

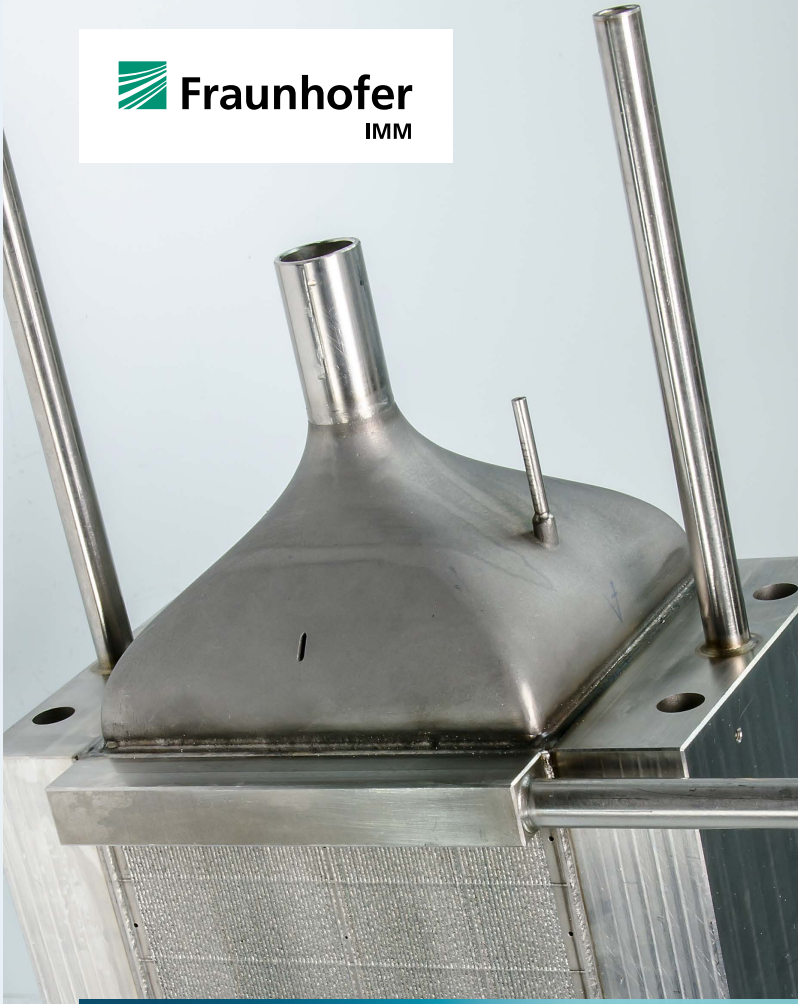
Contact

Dr. Christian Bidart
Group Mobile and Decentralized Energy Generation
Phone: +49 6131 990-349
christian.bidart@imm.fraunhofer.de

Fraunhofer Institute for Microengineering and Microsystems IMM
Carl-Zeiss-Strasse 18-20
55129 Mainz
Germany
www.imm.fraunhofer.de

All flyers of the division ENERGY
https://s.fhg.de/flyers-energy

Fraunhofer IMM



Power-to-Gas

Methanation of carbon dioxide in IMM compact microstructure reactors

Utilization of biogenic carbon dioxide from biogas plants

Renewable energy sources require reliable and efficient storage systems to cope with their fluctuating availability. Storage through methanation, i.e., the conversion of carbon dioxide from biogas plants into methane, is an option with clear advantages. In addition, methane as an energy carrier can fully take advantage of the well-developed natural gas distribution infrastructure.

IMM methanation process: well-established yet unique

Drawing on our well-established approach to microstructure reactors, Fraunhofer IMM has developed a methanation process which stands apart from conventional technology:

- decreasing temperature profile over the reactors
- high degree of conversion (i.e. higher than 97 percent)
- efficient utilization of catalytic raw material
- suitable scaling-up for capacities of biogas plants

IMM methanation catalyst technology: innovative and leading

Our catalyst formulations have been extensively tested demonstrating high selectivity, stability, and resistance to sulfur-based compounds commonly found in biogas. With our proprietary catalyst-formulation we have further demonstrated its effectiveness even under harsh temperature conditions and dynamic feed-gas compositions. The characteristics of our catalyst formulation enable the production of renewable methane suitable for direct injection into the natural gas grid. This makes IMM methanation technology ideal for flexible and decentralized energy-supply solutions.

» Benefit from IMM's vast experience in catalyst development for gas-phase reactions, along with its expertise in the design of reactors for fuel processing, synthesis, or combustion and the construction of modular chemical plants.«

Based on the proven concept of microstructure reactors

While conventional methanation plants mainly rely on two-stage fixed-bed reactor technology, Fraunhofer IMM has successfully applied its proven microstructure-reactor approach to develop a novel process. As a result, a two-stage catalytic methanation process using catalyst-coated microchannel reactors was conceived for carbon dioxide from biogas plants. The IMM methanation catalytic technology is robust and adequate for dynamic operation in power-to-gas systems.

IMM methanation reactor technology: robust and effective

Unlike traditional fixed-bed reactors, which suffer from poor catalyst utilization and hotspot generation, our innovative technology overcomes these drawbacks. Proven robust in practical applications, IMM reactor technology ensures efficient catalyst functioning, high carbon-dioxide conversion rates, and effective heat removal during methanation. By integrating this heat into district heating systems, process efficiency increases leading to maximum exploitation of feedstock and available primary energy.