



Benefit from our 20 years of experience in catalyst and reactor development for decentralized and mobile hydrogen supply.«

Contact

Dr. Gunther Kolb
Head of Division Energy
Phone: +49 6131 990-341
gunther.kolb@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, Mainz 2025



Fraunhofer
IMM



Hydrogen technology

IMM ammonia
cracker



Hydrogen supply for decentralized and mobile applications

Green ammonia can be stored and transported much more efficiently than hydrogen and is therefore a sustainable energy carrier for applications without direct connection to the hydrogen grid, such as mobile applications (e.g. maritime) or for decentralized power generation. To release the hydrogen at site, the ammonia is decomposed to hydrogen and nitrogen in a cracking reactor. For some applications such as power generation using PEM fuel cells purification of the hydrogen downstream of the cracker is required. Hydrogen/ammonia mixtures ("Spaltgas") produced by partial cracking can be used directly without purification as fuel for internal combustion engines or turbines.

IMM reactor and catalyst technology for ammonia cracking

IMM has developed ammonia cracking systems to supply hydrogen for fuel cells and engines utilizing different energy sources for the heat supply required for the cracking reaction. For these systems, IMM has developed unique ammonia cracking catalyst coatings, which are highly active and stable. In combination with IMM's microreactor technology, the developed ammonia cracking reactors are much more compact compared to conventional technology due to higher catalyst

What are your benefits?

- use green ammonia for hydrogen generation
- carbon footprint is reduced significantly
- increased efficiency (90 percent) of the ammonia cracking process
- significantly (up to 90 percent) reduced size of the system due to highly productive cracking reactor
- 75 kg/d hydrogen production proven, scalable to 10 t/d and more
- low cost fabrication steps: embossing, screen printing and laser welding allow cost reduction for product ramp-up

utilization and better heat management. IMM develops and builds integrated and automated ammonia cracking systems including evaporators, hydrogen purification by e.g. pressure swing adsorption and balance of plant components tailor made to customers' requirements.

What makes our solutions unique?

- tailor made catalyst coating
- no pre-treatment necessary
- no performance drop after longer shut-down
- less catalyst is required in comparison to conventional (fixed bed) catalyst technology
- higher productivity compared to conventional technology
- optimal heat management of the endothermic cracking reaction
- heat integration and utilization of off-gas for heating by catalytic combustion resulting in higher system efficiency