

### JOINT PROJECT

## Carbon2Chem<sup>®</sup>

KEEPING CARBON  
IN THE LOOP



<sup>1</sup> Dr.-Ing. Heiko Lohmann,  
Head of Carbon2Chem<sup>®</sup> sub-  
project "Higher Alcohols".

## L-IV | SYNTHESIS OF C<sub>2</sub><sup>+</sup>-ALCOHOLS AND C<sub>2</sub><sup>+</sup>-OLEFINS CATALYST TESTING

### Fraunhofer Institute for Environmental, Safety, and Energy Technology UMSICHT

Osterfelder Strasse 3  
46047 Oberhausen  
Germany

Dr.-Ing. Barbara Zeidler-Fandrich  
Head of Department  
Chemical Energy Storage  
Phone +49 208 8598-1143  
barbara.zeidler-fandrich@  
umsicht.fraunhofer.de

Dr.-Ing. Heiko Lohmann  
Group Manager  
Catalytic Processes  
Telefon +49 208 8598-1197  
heiko.lohmann@umsicht.fraunhofer.de

[www.umsicht.fraunhofer.de](http://www.umsicht.fraunhofer.de)

### Background

Within the Carbon2Chem<sup>®</sup> project, technologies are being developed to reduce CO<sub>2</sub> emissions at large industrial sites by using the emissions as a new source of raw materials for the chemical industry.

The focus lies on forming cross-industrial value creation chains and increasing energy efficiency by establishing cross-industrial networks.

This will be shown using the steel production site Duisburg/NRW as an example.

### Aims

The aim of the subproject is to develop an overall catalytic process for the use of steel mill gases for the production of short-chain alcohols and olefins. Alcohols and olefins can be used as fuels and are starting materials for other important chemical building blocks.

The task of Fraunhofer UMSICHT is the catalyst testing with artificial and real steel mill gases in differently scaled test plants including a technical demonstration plant.



1 Pilot plant "TomCat".

### Specific expertise

- Catalyst testing
- Development of catalytic processes

The catalysis group at Fraunhofer UMSICHT specializes in preparing, characterizing, and testing heterogeneous catalysts for industrial applications.

The group also has broad expertise within process engineering. Experience in the design and construction of plants and the testing of suitable process parameters has been gained in numerous research projects.

### Systems (Selection)

#### "Spider" parallel reactor

- Parallel investigation of 8 different catalysts
- Catalytic syngas conversion  
Temperature: max. 673 K,  
Pressure: max. 6 MPa, tube reactors  
(8 x approx. 0.2 ml), online GC

#### "TomCat" testing facility

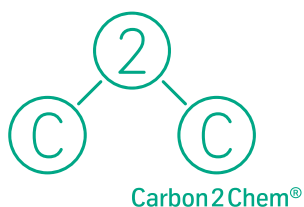
- Catalytic conversion of syngas  
Temperature: max. 1273 K,  
Tube reactor: 25 mm inner diameter,  
isothermal zone 150 mm, Online-MS

#### "Liquid Feed" testing facility

- Catalytic conversion of syngas with addition of liquid feed  
Temperature: max. 620 K,  
Pressure: max. 8 MPa, tube reactor  
(approx. 45 ml), online GC

### Further project partners in L-IV

- thyssenkrupp Industrial Solutions AG
- Evonik Industries AG (coordination)
- Ruhr-Universität Bochum, Laboratory of Industrial Chemistry
- Ruhr-Universität Bochum, Department of Energy Plant Technology
- RWTH Aachen, Institute of Technical and Macromolecular Chemistry



### Further information

[www.umsicht.fraunhofer.de/carbon-cycle](http://www.umsicht.fraunhofer.de/carbon-cycle)

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