

Forschung. Transfer. Nachhaltigkeit.



BACHELOR-/MASTERTHESIS (CHEMIE)

Recent Catalyst Advancements for the efficient CO₂-Conversion to Methanol in fixed bed reactors

Review and Catalyst Benchmark

SHORT DESCRIPTION

In the past years, CO₂-capture and utilization (CCU) in downstream processes has become a center point of international process research. For efficient conversion of CO₂ to other C1-C4-Chemicals, effective catalysts are necessary for advancement of the technologies. FiW has been active in research around CO₂-based methanol synthesis for over 10 years now. In different projects, an array of innovative carrier catalysts has been tested and deployed in pilot and demonstration plants. For consolidation of the knowledge base around the effective synthesis of Methanol from CO₂, a review of recent advances in catalytic conversion of CO₂ to Methanol is necessary. Research from FiW will be ranked among available research. Special focus will be put on the mechanics of CO₂ conversion over different catalyst compounds and on specific physio-chemical characterization techniques of catalysts presented in available literature. An interpretation of possible mechanisms for CO₂-conversion will be conducted.

Following tasks are planned for the thesis:

- Consolidation and literature review of CO₂-based methanol catalysis concerning production of effective catalysts, active materials and catalyst carriers and catalyst additives
- Quantitative review of following physio-chemical catalyst tests: N₂-Adsorption/-Desorption, H₂-reducibility, NH₃ - and CO₂-adsorption and calculated catalyst surface area from N₂O-titration; XPS-Peak-distribution
- Catalyst Performance in CO₂-Conversion to Methanol concerning Selectivity, Conversion ratio and Methanol production rates under varying synthesis parameters (Pressure, Temperature, Flow-Rate, Gas Composition)
- Analysis of possible reaction pathways of CO₂ to Methanol on catalyst surface

The thesis is conducted in a joint effort between FiW and ITMC (Prof. Liauw). The thesis can be written in English or German.

TIMELINE

Approx. 4-5 Months – starting now

CONTACT

Forschungsinstitut für Wasserwirtschaft und Klimazukunft
an der RWTH Aachen (FiW) e.V.

Kackertstraße 15 – 17 / 52072 Aachen

Carl Fritsch, M.Sc. / fritsch@fiw.rwth-aachen.de / Fon +49 241 80 2 39 55

Wir sind Unterzeichner der

charta der vielfalt

Für Diversity in der Arbeitswelt

