ETH zürich

ICB PhD public presentations

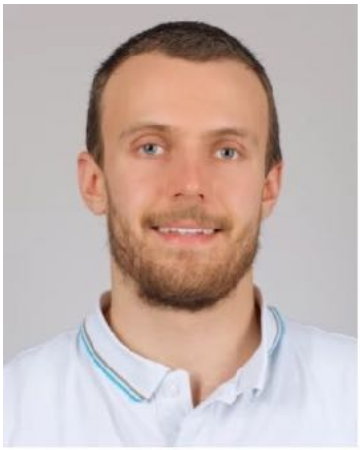
UNRAVELING ACTIVE SITE PROPERTIES IN COPPER-EXCHANGED ZEOLITES FOR THE METHANE-TO-METHANOL CONVERSION USING COMPLEMENTARY SPECTROSCOPIC TOOLS

Andreas Brenig

ICB / The van Bokhoven Group and Laboratory for Catalysis and Sustainable Chemistry

Supervisor: Prof. Dr. Jeroen A. van Bokhoven

Co-examiners: Prof. Dr. Gunnar Jeschke, Dr. Vitaly Sushkevich and Dr. Ceri Hammond



31/10/2023, 1:00 pm, Paul Scherrer Institute OFLG/401 and on Zoom (https://psich.zoom.us/j/8738516515)

Project Summary: Copper-exchanged zeolites can selectively oxidize methane, an abundant but frequently wasted hydrocarbon source, into methanol under mild process conditions. The material performance is governed by the redox properties of the incorporated copper active sites. Consequently, their characterization is essential to propose strategies for the rational design of copper containing zeolites with desired features. Complementary operando/in situ spectroscopic methods are developed to gain site-specific insight into the complex distribution of copper centers in various zeolites. This allows to associate the material's composition and topology with the nature of the present copper species. These correlations provide deliberate control over the copper speciation and hence facilitate the assessment of the reactivity of individual copper sites and their kinetic properties. The analysis of the behavior of distinct copper species in partial CH_4 oxidation is complemented by a detailed investigation of their formation mechanism during treatment in oxygen to establish a complete understanding of the entire reaction cycle.

CV: Andreas obtained his B.Sc. and M.Sc. in Chemistry from the Technical University of Munich. He continued to work as a PhD student at the ETH Zurich and the Paul Scherrer Institute.