Rachit **Khare** | PhD

Catalysis Research Center, Technical University of Munich

Chair II for Technical Chemistry (Prof. Dr. Johannes A. Lercher)
Technical University of Munich
Lichtenbergstraße 4, 85747 Garching (Germany)

+49 176 595 78758

rachit.khare@tum.de

rachitkhare.com

"I am interested in combining kinetic and mechanistic studies with operando spectroscopic measurements and theoretical calculations (density functional theory and kinetic modeling) to gain fundamental insights into industrially relevant heterogeneous catalytic systems"

EDUCATION

2011 – 2016 **Ph.D. in Chemical Engineering**
Department of Chemical Engineering & Materials Science
University of Minnesota, Minneapolis (USA)
Supervised by **Prof. Dr. Aditya Bhan**

Thesis title: "A Mechanistic Understanding of Light Olefins Selectivity in Methanol-to-Hydrocarbons Conversion on MFI"

2007 – 2011 **B.Tech. in Chemical Engineering**
Department of Chemical Engineering
Indian Institute of Technology Roorkee, Roorkee (India)

WORK EXPERIENCE

2021 – present **Group Leader**
Chair of Technical Chemistry II (**Prof. Dr. Johannes A. Lercher**)
Department of Chemistry & Catalysis Research Center
Technical University of Munich, Garching (Germany)

Key Research Areas: Heterogeneous Catalysis, X-ray Absorption Spectroscopy, Mechanistic and Kinetic Studies, Density Functional Theory, Electrochemistry, Photochemistry, Data Science in Catalysis

2017 – 2020 **Postdoctoral Researcher**
Chair of Technical Chemistry II (**Prof. Dr. Johannes A. Lercher**)
Department of Chemistry & Catalysis Research Center
Technical University of Munich, Garching (Germany)

Key Research Areas: Heterogeneous Catalysis, X-ray Absorption Spectroscopy, Catalyst Synthesis and Characterization, Photochemistry

2011 – 2016 **Research Assistant**
Department of Chemical Engineering & Materials Science (**Prof. Dr. Aditya Bhan**)
University of Minnesota, Minneapolis (USA)

Key Research Areas: Heterogeneous Catalysis, Mechanistic and Kinetic Studies

2010 **Intern**
Panipat Refineries Division
Indian Oil Corporation Limited, Panipat (India)

RESEARCH PUBLICATIONS

2022 *Porphyrinic MOF derived single-atom electrocatalyst enables methanol oxidation* — **Chem. Eng. J.**
Z. Zhou, J. Zhang, S. Mukherjee, S. Hou, **R. Khare**, M. Döblinger, O. Tomanec, M. Otyepka, M. Koch, L. Zhou, W. Li, R.A. Fischer
doi: 10.1016/j.cej.2022.137888

2022 *Highly active and selective sites for propane dehydrogenation in zeolite Ga-BEA* — **J. Am. Chem. Soc.**
L. Ni, **R. Khare**, R.Bermejo-Deval, R. Zhao, L. Tao, Y. Liu, J.A. Lercher
doi:10.1021/jacs.2c03810

2022 *Speciation of Cu-oxo clusters in FER for selective oxidation of methane to methanol* — **Chem. Mater.**
L. Tao, I. Lee, **R. Khare**, A. Jentys, J. Fulton, M. Sanchez-Sanchez, J.A. Lercher
doi:10.1021/acs.chemmater.1c04249

2022 *Di- and tetrameric molybdenum sulfide clusters activate and stabilize dihydrogen as hydrides* — **JACS Au**
R. Khare‡, R. Weindl‡, A. Jentys, K. Reuter, H. Shi, and J.A. Lercher
doi:10.1021/jacsau.1c00507
‡ *equal contribution*

2021 *Activity of Cu-Al-oxo extra-framework clusters for selective methane oxidation on Cu exchanged zeolites* — **JACS Au** doi:10.1021/jacsau.1c00196
I. Lee, M.S. Lee, L. Tao, T. Ikuno, **R. Khare**, A. Jentys, T. Huthwelker, C. Borca, A. Kalinko, O. Gutiérrez, N. Govind, J. Fulton, J.Z. Hu, V.A. Glezakou, R. Rousseau, M. Sanchez-Sanchez, J.A. Lercher

2021 *Zeolite stabilized di- and tetranuclear molybdenum sulfide clusters form stable catalytic hydrogenation sites* — **Angew. Chem. Int. Ed.** doi:10.1002/anie.202015769
R. Weindl‡, **R. Khare**‡, K. Reuter, A. Jentys, H. Shi, J.A. Lercher
‡ *equal contribution*
Featured in the ESRF Research Highlights 2021

2020 *Importance of methane chemical potential for its conversion to methanol on Cu-exchanged mordenite* — **Chem. Eur. J.** doi:10.1002/chem.202000772
J. Zheng, I. Lee, E. Khramenkova, M. Wang, B. Peng, O. Gutiérrez, J. Fulton, **R. Khare**, D. Camaioni, A. Jentys, G. Haller, E. Pidko, M. Sanchez-Sanchez, J.A. Lercher
Featured on the Front Cover of Chemistry: A European Journal 34/2020

2020 *Development of photochemical and electrochemical cells for operando X-ray absorption spectroscopy during photocatalytic and electrocatalytic reactions* — **Phys. Chem. Chem. Phys.** doi:10.1039/d0cp00654h
R. Khare, A. Jentys, J.A. Lercher

2017 *A mechanistic basis for the effect of aluminum content on ethene selectivity in methanol-to-hydrocarbons conversion on HZSM-5* — **J. Catal.** doi:10.1016/j.jcat.2017.02.022
R. Khare, Z. Liu, Y. Han, A. Bhan

2016 *Implications of cofeeding acetaldehyde on ethene selectivity in methanol-to-hydrocarbons conversion on MFI and its mechanistic interpretation* — **ACS Catal.** doi:10.1021/acscatal.5b02818
R. Khare, S.S. Arora, A. Bhan

2015 *Mechanistic studies of methanol-to-hydrocarbons conversion on diffusion-free MFI samples* — **J. Catal.** doi:10.1016/j.jcat.2015.05.012
R. Khare, A. Bhan

2015 *A mechanistic basis for the effects of crystallite size on light olefin selectivity in methanol-to-hydrocarbons conversion on MFI* — **J. Catal.** doi:10.1016/j.jcat.2014.10.016
R. Khare, D. Millar, A. Bhan
Featured in the Journal of Catalysis Featured Articles – January 2015

2013 *A descriptor for the relative propagation of the aromatics- and olefins-based cycles in methanol-to-hydrocarbons conversion in H-ZSM-5* — **J. Catal.** doi:10.1016/j.jcat.2013.03.021
S. Ilias, **R. Khare**, A. Malek, A. Bhan

2022 *Low-temperature upcycling of polyolefins into liquid alkanes via tandem cracking-alkylation* — **Science** (under review)
W. Zhang, S. Kim, L. Wahl, H. Xu, L. Hale, **R. Khare**, W. Hu, J. Hu, O.Y. Gutiérrez, Y. Liu, J.A. Lercher

2022 *An in-depth study in the confinement of zeolitic Brønsted acid sites by proximal extra-framework Si(OH)$_x$ groups* — **Nat. Catal.** (under review)
R. Zhao, **R. Khare**, Y. Zhang, M. Sanchez-Sanchez, R. Bermejo-Deval , Yue Liu, and J.A. Lercher

2022 *Memory transitions in alkali-treated metal organic frameworks controlling the oxygen evolution reaction* — **Energy Environ. Sci.** (under review)
X. Ma, S. Hou, S. Mukherjee, **R. Khare**, G. Gao, Q. Ai, B. Garlyyev, W. Li, M. Koch, J. Warnan, A.S. Bandarenka, R.A. Fischer

RESEARCH GRANTS AND FUNDING

2022 **Danmarks Frie Forskningsfond – Independent Research Fund** — **Co-proposer** (awarded)
Spectroscopy of molybdenum sulfide catalysts, from clusters to layers
PI: S. Mossin (Denmark Technical University)

2022 **Deutsche Forschungsgemeinschaft – Research Grant** — **Co-proposer** (to be submitted)
Low-temperature catalytic upcycling of polyolefin wastes into liquid fuels via tandem cracking-alkylation: Towards a sustainable refinery
PI: J.A. Lercher (Technical University of Munich)

2022 **Deutsche Forschungsgemeinschaft – Research Grant** — **Co-proposer** (in preparation)
Olefin dimerization on Ni-exchanged zeolites
PI: J.A. Lercher (Technical University of Munich)

TALKS

Jul 2022	**20th International Zeolite Conference**, Valencia (Spain) *Single Ni ions hosted in zeolites as active sites for selective dimerization of butenes* L. Löbbert, **R. Khare**, M. Sanchez-Sanchez, J. Lercher	**Contributing Author**
Jun 2022	**55th German Catalysis Conference**, Weimar (Germany) *Zeolite-encapsulated molybdenum sulfide clusters activate and stabilize hydrogen in the form of hydride species* **R. Khare**, R. Weindl, A. Jentys, J.A. Lercher	**Presenting Author**
May 2022	**27th North American Catalysis Society Meeting**, New York (USA) *Hydrothermal stability of Cu-SSZ-39 compared to Cu-SSZ-13 in NH_3-SCR of NO_x* M. Wenig, **R. Khare**, A. Jentys, J.A. Lercher	**Contributing Author**
	Zeolite encapsulated molybdenum sulfide clusters mimicking the nitrogenase enzyme's active site R. Weindl, **R. Khare**, H. Shi, J.A. Lercher	**Contributing Author**
Mar 2022	**33rd German Zeolite Conference**, Frankfurt (Germany) *Zeolite-encapsulated molybdenum sulfide clusters activate and stabilize hydrogen in the form of hydride species* **R. Khare**, R. Weindl, A. Jentys, J.A. Lercher	**Presenting Author**
Jan 2022	**8th UK Catalysis Conference**, Loughborough (England) *Nature of active sites in Cu-exchanged small pore zeolites during selective catalytic reduction of nitrogen oxides with ammonia* **R. Khare**, M. Wenig, A. Jentys, J.A. Lercher	**Presenting Author**
	Zeolite stabilized molybdenum sulfide clusters activate hydrogen as hydride species and form stable catalytic hydrogenation sites R. Weindl, **R. Khare**, A. Jentys, J.A. Lercher	**Contributing Author**
Jan 2021	**European XFEL and DESY User Meeting** (Online) *Development of operando reaction cell for simultaneous measurement of UV-Vis DRS and XAS at P64/65* **R. Khare**, A. Jentys, J.A. Lercher	**Presenting Author**
Dec 2020	**Conference on Operando Characterization of Catalysts at Work** (Online) *Monitoring the dynamic nature of active sites in Cu-exchanged zeolites during selective catalytic reduction of NO_x using operando X-ray absorption spectroscopy* **R. Khare**, M. Wenig, A. Jentys, and J.A. Lercher Awarded best oral presentation	**Presenting Author**
Jun 2020	**17th International Congress on Catalysis**, San Diego (USA) *Nature of active sites in Cu/AEI during selective catalytic reduction of NO_x with NH_3 using operando X-ray absorption spectroscopy* **R. Khare**, M. Wenig, R.B. de Val, A. Jentys, J.A. Lercher	**Presenting Author**
Feb 2020	**ESRF User Meeting**, Grenoble (France) *Monitoring structural changes in Mo_xS_y phase encaged within the confinement of zeolites via HERFD-XAS and VtC-XES measured under sulfidation/hydrogenation conditions* **R. Khare**, R. Weindl, H. Shi, A. Jentys, J.A. Lercher	**Presenting Author**
Jan 2020	**European XFEL and DESY User Meeting**, Hamburg (Germany) *Nature of Cu active species in small pore zeolites during NH_3-SCR* **R. Khare**, A. Jentys, J.A. Lercher	**Presenting Author**
Dec 2019	**EBS Workshop on X-ray Emission Spectroscopy**, Grenoble (France) *Monitoring structural changes in Mo_xS_y phase encaged within the confinement of zeolites via HERFD-XAS and VtC-XES measured under sulfidation/hydrogenation conditions* **R. Khare**, R. Weindl, H. Shi, A. Jentys, J.A. Lercher	**Presenting Author**
Jul 2016	**16th International Congress on Catalysis**, Beijing (China) *Catalytic consequences of the dual aromatics- and olefins-based cycles on light olefin selectivity in methanol to hydrocarbons conversion* **R. Khare**, A. Hwang, A. Bhan	**Contributing Author**
Mar 2016	**251st American Chemical Society National Meeting**, San Diego (USA) *Enhancing light olefin selectivity in methanol-to-hydrocarbons conversion by cofeeding oxygenates* **R. Khare**, S.S. Arora, A. Bhan	**Presenting Author**
Dec 2015	**International Chemical Congress of Pacific Basin Societies**, Honolulu (USA)	

Zeolites with nanometer diffusion lengths: Mechanistic implications in shape selective catalytic conversion of methanol to hydrocarbons — **Contributing Author**
D. Millar, **R. Khare**, A. Bhan

Jun 2015 **24th North American Catalysis Society Meeting**, Pittsburgh (USA)
A mechanistic basis for the effects of crystallite size on light olefin selectivity in methanol-to-hydrocarbons conversion on MFI — **Presenting Author**
R. Khare, D. Millar, A. Bhan

Nov 2014 **American Institute of Chemical Engineers Annual Meeting**, Atlanta (USA)
A mechanistic basis for the effects of crystallite size on light olefin selectivity in methanol-to-hydrocarbons conversion on MFI — **Presenting Author**
R. Khare, D. Millar, A. Bhan

Nov 2013 **American Institute of Chemical Engineers Annual Meeting**, San Francisco (USA)
Kinetics and mechanisms of aromatic methylation and dealkylation in methanol-to-hydrocarbons conversion on HZSM-5: What are the aromatics precursors to light olefins? — **Contributing Author**
S. Ilias, I.M. Hill, **R. Khare**, A. Bhan

Dec 2009 **8th Indo-German Winter Academy**, Roorkee (India)
Combined thermal and solar power generation. What does it bring for the future? — **Presenting Author**
R. Khare

Sep 2009 **Students' Congress of Indian Institute of Chemical Engineers**, Roorkee (India)
Arsenic removal from drinking water using electrocoagulation and optimization of its parameters using response surface methodology — **Presenting Author**
R. Khare, S. Sharma, A. Kumar, I.M. Mishra

POSTERS

May 2022 **27th North American Catalysis Society Meeting**, New York (USA)
Nature of active sites in Cu-exchanged small pore zeolites during NH_3-SCR: an operando X-ray absorption spectroscopy study — **Contributing Author**
R. Khare, M. Wenig, A. Jentys, J.A. Lercher

Mar 2021 **54th German Catalysis Conference**, Weimar (Germany)
Effect of Ni loading and Brønsted acidity on the performance of FAU zeolites in butene dimerization — **Contributing Author**
L. Löbbert, **R. Khare**, R.B. deVal, M. Sanchez-Sanchez, J.A. Lercher

Mar 2020 **53rd German Catalysis Conference**, Weimar (Germany)
A mechanistic study of selective partial photo-oxidation of primary and secondary alcohols to aldehydes and ketones under visible light illumination on graphitic carbon nitride — **Presenting Author**
R. Khare, A. Jentys, J.A. Lercher

Mar 2019 **52nd German Catalysis Conference**, Weimar (Germany)
Selective partial oxidation of C_1-C_3 alcohols to aldehydes/ketones on graphitic carbon nitride under visible light illumination — **Presenting Author**
R. Khare, A. Jentys, J.A. Lercher

Mar 2016 **251st American Chemical Society National Meeting**, San Diego (USA)
Enhancing light olefin selectivity in methanol-to-hydrocarbons conversion by co-feeding oxygenates — **Presenting Author**
R. Khare, S.S. Arora, A. Bhan

Aug 2015 **Gordon Research Conference on Nanoporous Materials**, Holderness (USA)
Methanol-to-hydrocarbons conversion: Effects of crystallite size and intrinsic mechanistic behavior of MFI — **Presenting Author**
R. Khare, D. Millar, A. Bhan

Aug 2015 **Gordon Research Seminar on Nanoporous Materials**, Holderness (USA)
Methanol-to-hydrocarbons conversion: Effects of crystallite size and intrinsic mechanistic behavior of MFI — **Presenting Author**
R. Khare, D. Millar, A. Bhan

Aug 2014 **Gordon Research Conference on Catalysis**, New London (USA)
A mechanistic basis for the effects of crystallite size on light olefin selectivity in methanol-to-hydrocarbons conversion on MFI — **Presenting Author**
R. Khare, D. Millar, A. Bhan

AWARDS AND HONORS

2020 **Best Oral Presentation Award**
Conference on Operando Characterization of Catalysts at Work

2015 **Doctoral Dissertation Fellowship** **$22000**
University of Minnesota, Minneapolis (USA)

2011 **Best Thesis Award (B.Tech. Chemical Engineering)**
Indian Institute of Technology Roorkee, Roorkee (India)

2007 **University Scholarship** **1 year tuition fee**
Indian Institute of Technology Roorkee, Roorkee (India)

TEACHING

2022 **Industrial Chemical Processes II** **Lecturer**
M.Sc., Department of Chemistry, Technical University of Munich

2022 **Methods of Catalysis** **Lecturer**
M.Sc., Department of Chemistry, Technical University of Munich

2021 **Methods of Catalysis** **Lecturer**
M.Sc., Department of Chemistry, Technical University of Munich

2019 **Technical Chemistry Praktikum** **Lab Supervisor**
B.Sc., Department of Chemistry, Technical University of Munich

2018 **Technical Chemistry Praktikum** **Lab Supervisor**
B.Sc., Department of Chemistry, Technical University of Munich

2017 **Technical Chemistry Praktikum** **Lab Supervisor**
B.Sc., Department of Chemistry, Technical University of Munich

2014 **Physical and Chemical Thermodynamics** **Teaching Assistant**
B.ChEn., Department of Chemical Engineering & Materials Science, University of Minnesota

2014 **Chemical Engineering Design** **Teaching Assistant**
B.ChEn., Department of Chemical Engineering & Materials Science, University of Minnesota

2012 **Reaction Kinetics and Reactor Design** **Teaching Assistant**
B.ChEn., Department of Chemical Engineering & Materials Science, University of Minnesota

STUDENT SUPERVISION

2022 **Heewoo Seo**, Department of Chemistry, TU Munich **M.Sc. Internship** (on-going)
Photochemical reduction of carbon dioxide to methanol

2022 **Disha Malik**, Department of Chemical Engineering, Delhi Technological University **B.Tech. Internship**
X-ray absorption/emission spectroscopy study of 3d-transition metals on bench-top easyXAFS
Funded by: Deutscher Akademischer Austauschdient (DAAD)

2020 **Angelica Tessa Yunanto**, Department of Chemical Engineering, TU Munich **M.Sc. Internship**
Photocatalytic hydrogen evolution reaction on graphitic carbon nitride

2020 **Xhang Xiaoyang**, Department of Chemical Engineering, TU Munich **M.Sc. Internship**
Electrocatalytic reduction of carbon dioxide

2019 **Valentin Menzel**, Department of Chemistry, TU Munich **M.Sc. Thesis**
Electrocatalytic conversion of carbon dioxide to methanol

2019 **Corbinian grön**, department of chemistry, tu munich **B.Sc. Thesis**
Partial alcohol oxidation under visible light illumination

2019 **Daphne Bondal**, Department of Chemistry, TU Munich **B.Sc. Thesis**
Carbon dioxide hydrogenation to carbon dioxide

2019 **Marcus Chua Wen Hao**, Department of Chemistry, TU Munich **B.Sc. Thesis**
Synthesis and characterization of novel catalysts for photocatalytic and electrocatalytic CO_2 reduction

2019 **Dominik Grünwald**, Department of Chemistry, TU Munich **B.Sc. Thesis**
Selective oxidation of alcohols with simultaneous evolution of H_2 by g-C_3N_4 under visible light illumination

2019	**Faishal Inshauddin**, Department of Chemistry, TU Munich *Photocatalytic conversion of carbon dioxide to fuels*	**B.Sc. Thesis**
2018	**Matthias Schmidt**, Department of Chemical Engineering, TU Munich *Chemical methanation of CO_2 as a catalytic Process*	**M.Sc. Internship**
2018	**Angelica Tessa Yunanto**, Department of Chemical Engineering, TU Munich *Electrocatalytic hydrogen evolution reaction and reduction of carbon dioxide*	**B.Sc. Thesis**
2018	**Peggy Jing-Ting Huang**, Department of Chemical Engineering, TU Munich *Photocatalytic hydrogen evolution on Pt/g-C_3N_4 under visible light illumination*	**B.Sc. Thesis**
2018	**Magdalena Maria Kleybolte**, Department of Chemistry, TU Munich *Photocatalytic hydrogen evolution graphitic carbon nitride*	**B.Sc. Thesis**
2018	**Ernest Jian Ming Yap**, Department of Chemistry, TU Munich *Photochemical conversion of carbon dioxide on g-C_3N_4 catalysts*	**B.Sc. Thesis**
2018	**Zhen Yu Choong**, Department of Chemistry, TU Munich *Catalytic conversion of carbon dioxide to methanol*	**B.Sc. Thesis**
2018	**Stephen Liefeldt**, Department of Chemistry, TU Munich *Synthesis of single atom bimetallic alloys supported on g-C_3N_4*	**B.Sc. Thesis**

EXPERIENCE AT X-RAY SYNCHROTRON FACILITIES

Aug 2022	P65 **German Electron Synchrotron DESY**, Hamburg (Germany), **120 hours** *Low temperature upcycling of polyolefins in Lewis acidic ionic liquids: Effect of metal additives*	**Co-proposer** (accepted)
Jul 2022	Balder **MAX IV**, Lund (Sweden), **120 hours** *Elucidating the electronic and structural properties of Fe-, Co-, or Ni-promoted Mo sulfide clusters encapsulated within the micropores of NaY zeolite*	**Co-proposer** (accepted)
May 2022	Phoenix **Swiss Light Source**, Villigen (Switzerland), **120 hours** *Upcycling of polyolefins in Lewis acidic ionic liquids: Elucidation of key ion pairing interactions*	**Co-proposer**
Apr 2022	ID26 **European Synchrotron Radiation Facility**, Grenoble (France), **96 hours** *Understanding the effects of electronic properties of Ni in zeolites and metal organic frameworks on its activity for butene dimerization*	**Co-proposer**
Nov 2021	P64 **German Electron Synchrotron DESY**, Hamburg (Germany), **96 hours** *Understanding the effects of electronic structure of Pt on hydrogen adsorption from aqueous phase during electrocatalytic hydrogenation*	**Co-proposer**
Sep 2021	ID26 **European Synchrotron Radiation Facility**, Grenoble (France), **144 hours** *Elucidating the structural similarities between Fe-Mo sulfide clusters encapsulated in the micropores of NaY zeolite and the FeMo-cofactor of the nitrogenase enzyme*	**Co-proposer**
Aug 2021	P65 **German Electron Synchrotron DESY**, Hamburg (Germany), **144 hours** *Elucidating the structure of Fe-Mo sulfide clusters encapsulated in zeolite NaY during hydrogenation catalysis*	**Co-proposer**
May 2020	P64 **German Electron Synchrotron DESY**, Hamburg (Germany), **118 hours** *The nature of active sites in Cu/CHA and Cu/AEI during NH_3-SCR of NO_x: A study using spatially resolved operando Cu Kβ-VtC X-ray emission spectroscopy*	**Co-proposer**
2018–2020	P65 **German Electron Synchrotron DESY**, Hamburg (Germany), **522 hours** *Operando studies on photo-(electro-)catalysts under dynamic reaction conditions*	**Co-proposer**
Nov 2019	Phoenix **Swiss Light Source**, Villigen (Switzerland), **120 hours** *Linking structural changes in small-pore zeolites with the nature of Cu-species during the selective catalytic reduction of NO_x with NH_3*	**Co-proposer**
Jul 2019	P65 **German Electron Synchrotron DESY**, Hamburg (Germany), **96 hours** *Photo/electro-catalytic conversion of carbon dioxide to methanol on Rh@Au single-atom bimetallic alloys*	**Co-proposer**
Nov 2018	Phoenix **Swiss Light Source**, Villigen (Switzerland), **72 hours** *The structure of copper ions coordinated to Al T-sites during methane oxidation: Al XAFS, Cu L-edge XANES and TDDFT-based XANES calculations*	**Participant**

Oct 2018	ID26 **European Synchrotron Radiation Facility**, Grenoble (France), **120 hours** *Monitoring structural evolution during sulfidation and catalysis of dispersed Ni-Mo(W) phase within three-dimensional confines via in situ XAS*	**Participant, Organizer**
Sep 2018	P64 **German Electron Synchrotron DESY**, Hamburg (Germany), **118 hours** *Formation of copper oxo clusters in zeolites for the selective oxidation of methane to methanol at low temperature*	**Co-proposer**
2017–2018	P65 **German Electron Synchrotron DESY**, Hamburg (Germany), **558 hours** *Operando studies on catalysts under dynamic conditions*	**Participant, Organizer**
Sep 2017	BM26A **European Synchrotron Radiation Facility**, Grenoble (France), **144 hours** *Determining the structure, concentration and intrinsic activity of Ni-promoted sites in Ni-Mo-W sulfide catalysts via in situ and operando studies*	**Participant, Organizer**
Dec 2016	P65 **German Electron Synchrotron DESY**, Hamburg (Germany), **120 hours** *In situ investigations of the active state of Rh Co-catalysts on semiconductors during photocatalytic H_2 production via overall water splitting*	**Participant**

SKILLS

Programming	Python · Matlab · SQL
Quantum Chemistry Packages	Orca · Quantum Espresso · CP2K · NWChem
Database Management Tools	DBeaver

PROFESSIONAL ACTIVITIES

Reviewed Journals	Journal of Catalysis ACS Catalysis Applied Catalysis A: General Applied Catalysis B: Environmental Industrial & Engineering Chemistry Research Microporous and Mesoporous Materials Catalysis Communications
Reviewed Conferences	North American Catalysis Society Meeting

REFERENCES

Prof. Dr. Johannes A. Lercher
Professor (Chair of Technical Chemistry II)
johannes.lercher@ch.tum.de
+49 89 289 13544
Group page
Department of Chemistry & Catalysis Research Center
Technical University of Munich
Garching, Germany

Prof. Dr. Aditya Bhan
Professor
abhan@umn.edu
+1 612 626 3981
Group page
Department of Chemical Engineering & Materials Science
University of Minnesota
Minneapolis, USA

Prof. Dr. Karsten Reuter
Director
reuter@fhi.mpg.de
+49 30 8413 4800
Group page
Theory Department
Fritz Haber Institute of the Max Planck Society
Berlin, Germany