

„Fire and Ice“
Hydrogen and Carbon Dioxide as Building Blocks for Fuels and Chemicals
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World-wide deployment of technologies to generate electricity from renewable sources enable new catalytic pathways to produce fuels and chemicals from non-fossil raw materials (“power-to-X”).^[1] Hydrogen produced from electrolysis provides a possible connection between electrical energy and molecular energy carriers and products. It is widely discussed as the central element in future energy systems especially when combined with carbon dioxide as raw material for the production of “E-Fuels” and in the area of “Green Chemistry”. The present lecture will provide insight into challenges and opportunities resulting from this concept and discuss recent advances from our own research on catalytic processes using H₂ for the conversion CO₂.

[1] Zimmerman, J. B.; Anastas, P. T.; Erythropel, H. C.; Leitner, W.; *Science* 2020, 367, 397-400.



Walter Leitner is Director at the Max Planck Institute for Chemical Energy Conversion in Mülheim an der Ruhr (since 2017) and holds the Chair of Chemical Technology and Petrochemistry at RWTH Aachen University (since 2002). His research focuses on an organometallic approach to catalysis at the interface of energy and chemistry motivated by the principles of Green Chemistry. He obtained Ph.D. degree under the supervision of Prof. G. Brunner at the University of Regensburg. Then he joined the Prof. J. M. Brown group at the University of Oxford as a postdoctoral fellow. He was a Leibig Fellow at the Institute for Inorganic Chemistry at the University of Regensburg (1991-1992), research associate at the Max-Planck Working Group “CO₂-Chemistry” at the Friedrich-Schiller-University Jena (1992-1995). He obtained habilitation in inorganic chemistry in 1995 and was appointed as privatdozent (lecturer) at the same university. Since 1995 he was a group leader and then a head of the Technical Laboratories at the Max-Planck-Institute für Kohlenforschung, Mülheim/Ruhr. From 2002-2017 he was an external scientific member of this institute. From 2004 - 2016, Walter Leitner served first as Scientific Editor and later as Chairman of the Editorial Board of the Journal “Green Chemistry” and since 2021 he acts as a member of the Scientific Advisory Committee of “Angewandte Chemie”. In 2019, he chaired the 14th European Conference on Catalysis (EuropaCat) in Aachen. In 2022 he was a chairman of the Gorodn Conference on Green Chemistry, he belongs to the advisory boards of the International Symposium on Green Chemistry (since 2018) and the International Symposium on Homogeneous Catalysis (since 2016). The research efforts of his team have been recognized with several distinctions including the Georg Wittig-Victor Grignard Prize by the Société Chimique de France (2020). His collaboration with Dr. Christoph Gürtler (Covestro) to bring catalytic process utilizing CO₂ from science to application has led to nominations among the finalists for the Deutsche Zukunftspreis (Presidential German Future Award, 2019) and the European Inventor Award (2021). Walter Leitner published over 380 articles and monographs, with a total citation > 21 000 and h-index of 74 (Web of Science). He was a co-editor of the books *Chemical Synthesis Using Supercritical Fluids* (Wiley/VCH1999), *Multiphase Homogeneous Catalysis* (Wiley/VCH 2005) and *Handbook of Green Chemistry, Vol 4-6: Green Solvents* (Wiley/VCH, 2010). He is an inventor of 60 patents and patent applications and gave more than 100 invited lectures at international conferences and research institutes.



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