The Role of Catalysis for the Energy-Transition
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Opportunities and Potential of Electrocatalytic Energy Transition and Challenges in the Development of a new High-throughput Technology

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Abstract

The energy transition and the associated reduction in greenhouse gas emissions require various key strategies, in particular the reduction of energy demand by improved energy efficiency and lower energy consumption. An important driver in the optimization of energy efficiency is the improvement of heterogeneous catalysts. Moreover, it is inevitable to replace fossil energy carriers with chemical energy carriers produced by green electrical power. This will significantly increase the importance of electrocatalysis in the future.

One reason that existing alternative green processes or systems are slowly establishing themselves is the lower overall efficiency from energy production to the point of utilization compared to existing processes. Thus, electrocatalysis research has become increasingly important in recent years. The application of high-throughput technologies has already achieved success in other research fields in the past decades and thereby is also a promising approach for electrocatalyst research.

Reducing greenhouse gas emissions to zero is not feasible. In fact, the objective is to reduce greenhouse gas emissions to net zero. This indicates that processes emitting greenhouse gases will continue to exist in the future. However, these gases must be captured and stored or catalytically converted, either directly coupled to the process or offsite. The electrocatalytic reduction of CO_2 to valuable basic chemicals for the industry could play an important role in this context.

This poster will highlight current research efforts in electrocatalytic CO_2 reduction and the potential of these processes for the energy transition. Furthermore, the opportunities and challenges in the development of a high-throughput test system for electrocatalysis research are discussed. For the plant operation of this innovative research system, processes with different technology readiness levels are planned. In addition to research in electrochemical CO_2 reduction, the system is designed to optimize water electrolysis for the production of green hydrogen.