

Surface kinetics/electrocatalysis – “everything” starts at the surface

High temperature heterogeneous reactions between gas and solids at high temperature rely on the kinetics of processes at the gas-solid interface. Developing new processes and understanding of electrocatalysis at surfaces and interfaces of functional oxides are among the most important challenges to solve before sustainable electrochemical technologies like fuel cells, electrolyzers, and chemical membrane reactors can be implemented in large scale.

The present project will contribute as part of the electrochemistry group's effort to unravel the surface mechanism at mixed oxide ion – proton and electron conducting electrodes. The surface catalysis and transport properties, and the interplay between them, describing the chemical and electrochemical processes all the way from the reacting gas species adsorb on the surface until it is incorporated into the material will be pursued.

The figures - right hand illustrate interaction of an oxide surface with H_2 and N_2 , producing NH_3 in a mechanism where N_2 fixation involves diffusion via anion vacancies (right) – left hand describing combination of electrochemical and isotope gas-phase analysis to reveal surface reaction mechanisms.

