Jennifer Strunk

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Biography

Jennifer Strunk received her diploma and PhD degree in Industrial Chemistry from the Ruhr-University Bochum, Germany, in 2004 and 2008, respectively. After a postdoctoral stay at UC Berkeley (2008-2010) and employment as (junior) research group leader at Ruhr-University (2010-2014) and the Max-Planck-Institute for Chemical Energy Conversion (2014-2016), she recently became professor at the Leibniz Institute for Catalysis in Rostock, Germany, to lead the new Department of Heterogeneous Photocatalysis. She has published roughly 50 journal papers. Her prime research interest is to develop reliable reactors and reproducible research methodologies to understand the basic processes in heterogeneous photocatalysis.

Towards kinetic and mechanistic studies in photocatalytic CO_2 reduction

It would be a milestone in the field of energy conversion if the greenhouse gas CO_2 could be recycled with just the light of the sun as energy source. However, current studies in photocatalysis are predominantly based on a trial-and-error methodology, providing little insight into the fundamental physical and chemical processes.
It is the main aim of our research to operate photoreactors under reaction conditions of highest purity with highly sensitive trace gas analysis and to establish reaction protocols enabling us to conduct kinetic and mechanistic studies of photocatalytic CO_2 reduction and related reactions. As a first step, we managed to carry out photocatalytic CO_2 reduction under continuous-flow conditions, reaching steady-state operation. This provided the basis to study the influence of CO_2 concentration, light intensity, and the presence of oxygen on the formation rate of the main product methane. It was revealed that either the amount of charge carriers reaching the surface, or the number of catalytic active sites limit product formation. In a related study, evidence was obtained that the formation of CH_4 from CO_2 involved an intermediate C-C coupling step, leading to the formation of species such as acetic acid and acetaldehyde. Our studies can thus provide guidelines for future photocatalyst development.