Chemistry Departmental Seminar

Thursday 28 November

4.00 pm, Physics Lecture Theatre, Science Concourse

Dr Katharina Brinkert
University of Warwick

‘Sustainable Semiconductor-Electrocatalyst Systems for (Photo-) Electrocatalytic Nitrogen Reduction’

The discovery of ammonia (NH_3) synthesis, a milestone in the history of the chemical industry, has greatly enhanced global agriculture. Accordingly, NH_3 is the second-largest chemical produced worldwide, with 140 million tons manufactured annually via the Haber-Bosch process. The process requires high-purity streams of nitrogen and hydrogen, as well as high temperatures and pressures and it is therefore a major scientific challenge to find new, mild ways to activate the inert N-N triple bond. We recently found that dinitrogen reduction, resulting in ammonium ion production, can be catalyzed electrochemically by a CoMo thin-film. We focus on investigation of the surface composition of the electrode during electrocatalysis via X-ray photoelectron spectroscopy (XPS). Our work reveals that N_2 bond cleavage occurs on the electrocatalyst surface, suggesting that nitrogen reduction triggers dissociation of dinitrogen prior to hydrogenation.

Biography

Katharina obtained her Ph.D. degree from Imperial College London in 2015, where she worked on bioenergetics questions of Photosystem II. As part of a consecutive research fellowship from ESA, she investigated solar hydrogen production in microgravity environment before becoming a Leopoldina Postdoctoral Scholar with Prof Harry Gray at Caltech. Katharina recently started at the Department of Chemistry as an Assistant Professor in Catalysis. Her research interest comprise photoelectrocatalytic processes in artificial photosynthesis systems for solar fuel production in terrestrial and reduced gravity environments.

Dr Seb Pike
University of Warwick

‘Photoredox Reactivity of Titanium Oxo Clusters’

Well defined metal-oxo cluster molecules allow for mechanistic study of photoreactivity, giving insight into processes that can occur at the surfaces of bulk metal oxide semiconductors. Here we show that even the smallest titanium oxo clusters absorb UV light and can undergo two electron photoredox processes.

Biography

Seb studied at Oxford (MChem and DPhil) before moving to Imperial College London as a postdoc. He started his own independent research at Cambridge as a Herchel Smith Research Fellow in 2016 and recently moved to Warwick as a Royal Society University Research Fellow.