

Twisted roads - On the journey to chemical versatility

Innovation starts at interfaces, where two distinct areas meet.

Dedicated to this epigram, J.T.C.W.'s bachelor studies of chemistry started at the Albert-Ludwigs University Freiburg in a small village near the black forest.

Intrigued by the contrast of the brutal force in dinitrogen reduction and the sensitivity of the nitrogenase protein, exploration of this system began. Research on the two gene products NifU and NifS was pursued during the bachelor's thesis. NifU and NifS are responsible for the maturation process of nitrogenase. Being the inorganic chemists of the *nif*-gene cluster, they assemble FeMoco, the iron-sulfur cluster where dinitrogen reduction takes place. The gene products are purified and crystallisation is aimed. Crystallisation of NifS was successful, although no diffraction data for structure determination can be obtained.

Moving to the Technical University Munich onwards, studies in catalysis and surface science proceeded. During an internship at the company Clariant, a method was developed to determine zeolite's superficial acidity by in situ IR spectroscopy.

Finally, a master's project at the University of Edinburgh on homogenous carbon dioxide reduction, mediated by a simple, lipophilic perrhenate salt, was carried out. The system manages hydrosilylation of carbon dioxide to obtain silylmethylethers at room temperature and under atmospheric conditions. Key to its unique reactivity is the formation of an elusive hypervalent perrhenate hydridosilane as active species and transient perrhenate esters. Although rhenium being a scarce metal, all catalyst can be recycled easily. Furthermore, hydrosilylation of ketones and aldehydes is catalysed by the system.