

Elucidating the structure of surface sites using sensitivity enhanced NMR methods

Tuesday 14 January 2020 10:55 (15 minutes)

Catalytic processes in industry predominantly rely on heterogeneous-catalysts, a prominent example are supported vanadium oxide oxidation catalysts, VO_x/Support. Due to the small amount and ill-defined nature of their active sites, little is known about their structure.

While NMR would be a method of choice to probe the structure of surface sites, it particularly suffers from its low sensitivity. Dynamic Nuclear Polarization (DNP) can be a method of choice to alleviate the sensitivity problem, but it is currently mostly limited to spin ½ nuclei, with limited success with quadrupolar nuclei. Another issue that arises with this method is incompatibility of the radical or solvent required for DNP measurements with the catalyst.

An alternative method to study such systems would be the use of 1H-detection under fast MAS conditions, which has been especially fruitful in the case of studying biomolecules. Here we will present the use of this approach to identify surface sites in Vanadium oxide supported catalyst, we were able to detect low-abundant (<1%) surface species and characterize them with various correlation spectra in a time effective manner. Thereby showcasing how 1H-detection can be used for this case, which can be further expanded to other catalysts.

Authors: MANCE, Deni (ETH Zurich); Prof. COPÉRET, Christophe (ETH Zurich)

Presenter: MANCE, Deni (ETH Zurich)

Session Classification: NMR session 1