

CatLab Lecture Series hosted by FHI and HZB

Friday, January 26th 2024, 10:30-12:00

BESSY II, Seminar Room at the Entrance, Albert-Einstein-Straße 15, Berlin Adlershof

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Magnetic characterisation of catalysts for energy applications

The University of Cape Town, in collaboration with Sasol Technology, has developed an *operando* magnetometer, which allows to study ferromagnetic catalysts at industrial conditions of high temperature (>800°C) and high pressure (>50 bar) [1]. This unique set-up can be used to study phase changes (such as reduction, oxidation and carburization) as well as crystallites size changes. In certain cases even crystallite size distributions of the magnetic phase can be obtained. Importantly, while studying these changes, fully relevant kinetic data can be measured on this flow through fixed bed reactor system so that the catalyst performance can be directly linked to its current state. Examples of investigations on energy materials conducted with the set-up, which inform catalyst and process design, will be presented and these include, *inter alia*:

- Crystallite size dependent oxidation of cobalt, iron and nickel CO hydrogenation catalysts.
- Sintering of a cobalt and nickel CO hydrogenation catalyst as function of process conditions.
- Role of carbides in cobalt based Fischer-Tropsch synthesis.
- Leaching of cobalt from Pt-Co fuel cell catalysts.

[1] M. Claeys, E. van Steen, J.L Visagie, J. van de Loosdrecht, PCT Patent WO2010/004419 A2, 9 July 2009.