

Session of Focus Materialchemie – Wednesday, **30.11.2022** 16:00 – @ Seminarraum Lehar 02 (TU-Wien, Getreidemarkt 9, BC, OG. 02, room A46) – [join us](#) on ZOOM (ID: 983 0066 2349)

## **High Pressure XPS measurements at POLARIS**

Dr. Christopher Goodwin

*Department of Physics, Stockholm University, Sweden*

POLARIS is the first true high-pressure XPS capable of gathering surface-sensitive high-quality spectra at pressures exceeding one bar. Among the topics, we have researched several notable example systems: methanol and ammonia synthesis. Both systems are of great industrial importance and account for a significant portion of CO<sub>2</sub> emissions globally. With the insight provided at the unprecedented pressures POLARIS can reach, we have shed new insight into these and other catalytic systems. In particular, we have shown how both CO and CO<sub>2</sub> are vital components of methanol synthesis over a Cu-Zn catalyst and how each gas facilitates the formation of methanol. We also have shown the active state for ammonia synthesis for the first time on the atomic scale and identified the active phase of the iron catalyst and the reaction intermediates. With these insights, we have shown the need for more systems like POLARIS and, possibly, more importantly, future directions for similar designs.