

## O 112: Overview Talk Ib Chorkendorff

Time: Friday 13:15–14:00

Location: HE 101

**Invited Talk**

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**A surface science approach to thermal and electrochemical ammonia synthesis** — **IB CHORKENDORFF** — Technical University of Denmark, Kgs. Lyngby, Denmark

Activating of molecular Nitrogen is an extremely important process as it supplies in the form of fertilizer the nitrogen that it is a prerequisite for building all amino acids and nucleic acids essential for life. It would not be possible to sustain earths current population without having access to such activated nitrogen. After brief review of the history of activating nitrogen we shall concentrate on the ammonia synthesis and motivate why an alternative route to the current commercial Haber-Bosch could be attractive in a de-centralised electrified society. We shall here revisit the very first surfaces science reaction showing the

thermal ammonia synthesis over single crystal of Iron by G Somorjai, using a new device allowing for detailed surface science analysis and very sensitive synthesis conditions at ambient conditions. This will be extended to new routes of promotion showing how Cobalt can also be made very active. The active site will be identified by a combination of Cobalt single crystals with and without steps combined with reaction over mass-selected nanoparticles made in situ by a cluster source. In the second part we shall turn to electrochemical ammonia synthesis where we now have shown how one can make ammonia at ambient conditions. The Li mediated process will be discussed and we will show how we over the last 5 years have gone from having a process that did not make any ammonia to now being capable of obtaining more than 80% Faradaic efficiency and high current densities.