

## MM 13: Invited talk Langhammer

Time: Tuesday 9:30–10:00

Location: H43

**Invited Talk**

MM 13.1 Tue 9:30 H43

**Single Nanoparticle Insights to Create the Fastest Hydrogen Sensor in the World** — •CHRISTOPH LANGHAMMER — Department of Physics, Chalmers University of Technology, SE-41296 Göteborg, Sweden

Metal nanoparticles exhibit localized surface plasmon resonance, which provides unique opportunities for optical sensing and for fundamental studies of individual nano-entities. For example, using plasmonic nanoparticles as signal transducers in a hydrogen sensor offers the ultimate miniaturization limit of the single nanoparticle. At the same time, being able to address individual nanoparticles upon interaction

with hydrogen gas opens up unique opportunities to investigate metal-hydrogen interactions at the fundamental level beyond the traditional ensemble-averaged response, and thus shed light on the role of nanoparticle size, shape and microstructure on both hydrogenation thermodynamics and kinetics.

In this talk, I will discuss the single nanoparticle nanoplasmonic hydrogen sensing concept from both perspectives outlined above. Specifically, I will outline the critical role of both grain boundaries and nanoparticle shape on the hydride formation kinetics and thermodynamics in Pd and Pd-alloy nanoparticles, as identified in single particle experiments, and how these findings provide fundamental design rules for the development of the fastest hydrogen sensor in the world.