

CatLab Lecture Series hosted by FHI and HZB

---

**Friday, February 9<sup>th</sup> 2024, 10:30-12:00**

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

---

## Katarzyna Skorupska

Fritz-Haber-Institut, Berlin

### **Catalyst for Acetylene Hydrogenation: CatLab Approach**

The focus will be the catalyst characterization and development in heterogeneous catalysis in particular in acetylene hydrogenation. The role of acetylene hydrogenation in industry and future renewable energy approaches will be discussed.

The structure and performance relationship is the key point to design and produce an active and selective catalyst. The details of the acetylene hydrogenation reaction mechanism will be discussed. Parallel to desired partial hydrogenation leading to ethylene there are also parasite processes like full hydrogenation, dimerization, polymerization and coking that consume acetylene and hydrogen decreasing the selectivity of the reaction.

Selectivity is governed by subsurface carbon or other light elements or alloys (Au, Ag, Pb, Ga) which occupy the octahedral voids in the Pd lattice. This suppresses the  $\beta$ Pd-H formation that is responsible for unselective hydrogenation. Existing Pd alloy catalysts still underperform due to their tendency to agglomerate. The role of a second element within the palladium lattice will be discussed. The optimization of the catalyst for selective hydrogenation of acetylene was realized via a laterally condensed catalyst (LCC) with reactive and functional interfaces. The concept and details of this development will be highlighted.