

MS40-P10 | THE DYNAMIC STRUCTURE OF $\text{Au}_{38}(\text{SR})_{24}$ NANOCCLUSERS SUPPORTED ON CeO_2 UNDER CO OXIDATION

Pollitt, Stephan (TU Wien - Institute of Materials Chemistry, Vienna, AUT); Barrabés, Noelia (TU Wien - Institute of Materials Chemistry, Vienna, AUT); Rupprechter, Günther (TU Wien - Institute of Materials Chemistry, Vienna, AUT)

Thiolate protected gold nanoclusters ($\text{M}_n(\text{SR})_m$) with sizes around one nanometer have become an extensively studied field. This is due to their unique properties resulting from quantum size effects and molecule-like structures. In nanocatalysis, it is a challenge to study structure reactivity relations under real life conditions because of the variety in active sites due to the size distribution in nanoparticles. With UHV (Ultra High Vacuum) techniques, well defined model systems can be perfectly understood, but the pressure gap impedes the transfer of information to real life conditions.

Thiolate protected Au nanoclusters offer the possibility to synthesize a homogenous and monodisperse active site. Thus, they allow for new pathways in catalyst design and fundamental research. Supported on oxides, these clusters have been proven to be highly active catalysts in several reactions. The amount of clusters on a support is about 1%wt in common cases, therefore structural investigations are impeded. However, XAFS (X-ray Absorption Fine Structure Spectroscopy) is well suited due to its low detection limit and elemental selectivity, that allows the investigation of the sample from different elemental points of view.

In our study, $\text{Au}_{38}(\text{SC}_2\text{H}_4\text{Ph})_{24}$ clusters supported on CeO_2 were investigated during an oxidative pre-treatment and in heterogenous CO oxidation under reaction conditions to understand structure reactivity relations. *In-situ* XAFS measurements were performed at Au-L₃ edge and static measurements at liquid N₂ temperature at S K-edge and Au-L₃ edge. Thereby, we clearly evidenced structural changes related to different behavior in reactivity, including distinct changes in the cluster's protecting ligand sphere.