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Microscopy and spectroscopy on model catalysts in gas environments

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Propositions - Stellingen

accompanying the thesis

"Microscopy and Spectroscopy on Model Catalysts in Gas Environments"

1. Flat ZnO(10 $\bar{1}$ 0) in UHV is not a suitable model system for methanol steam reforming on Cu-ZnO/Al₃O₄. *Chapter 3 of this thesis*
2. TiO₂ nanoparticles do not provide atomic oxygen to gold during CO oxidation on TiO₂/Au(111). *Chapter 4 of this thesis*
3. CO can block H₂O dissociation sites on Co(0001) more efficiently than H₂. *Chapter 5 of this thesis*
4. Small concentrations of impurities can have a significant influence on the results of in situ studies. *Chapters 3, 4, and 5 of this thesis*
5. The layer thickness t that Newberg et al. use to determine OH coverages from XPS measurements on ZnO(10 $\bar{1}$ 0) is ill-defined for coverages below one monolayer. *J. T. Newberg et al., J. Phys. Chem. B 2018, 122, 472*
6. The XPS measurement provided by Wang et al. is not sufficient evidence that the structure they observe with STM on Au(111) after CO exposure consists only of gold atoms. *J. Wang et al., J. Am. Chem. Soc. 2016, 138, 1518*
7. The lifting of the herringbone observed by Piccolo et al. on Au(111) in CO at room temperature is likely caused by contaminants in the gas or on the sample. *L. Piccolo et al., Surface Science 2004, 566–568, 995 and Chapter 4 of this thesis*
8. By identifying the same XPS peak on Co(0001) as two different species in separate studies, Böller et al. neglect the hydrocarbon background in the CO gas as well as a possible formation of graphitic carbon under Fischer-Tropsch conditions. *B. Böller et al., ACS Catal. 2015, 5, 6802 and Nature Catalysis 2019, 2, 1027*
9. Being an employee and a student simultaneously is a useful yet rare concept.
10. Even in the hardest of sciences a positive and honest manner of communication promotes motivation and success.

Sabine Wenzel
Leiden, 16.09.2021