Oxidation catalysis on Pt and Au : complexity of simple chemistry

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Acknowledgments

The studies using the ReactorSTM were experimentally extraordinarily challenging and, therefore, relied heavily on the technical support of the department of fine mechanics. Specifically, Mirthe Bergman and Peter C. van der Tuijn are gratefully acknowledged.

I am deeply indebted to Dr. Marcel J. Rost for the thorough and (very often) lengthy scientific discussions, which were always extremely beneficial and insightful. In addition, I am grateful to Prof. Dr. Joost W.M. Frenken for his role as supervisor and source of inspiration. Also, I would like to acknowledge my copromoters, Dr. Irene M.N. Groot and Dr. Ludo B.F. Juurlink for their support. Moreover, the scientific and experimental support of Dr. Johan W. Bakker and proofreading of the manuscript by Else P. van Haastrecht was greatly welcomed.

This work would not have been possible without administrative support of Ellie van Rijsewijk-Salman, Charlotte Laurense-Griffioen, and Daniëlle Duijn-ter Veer; assistance from Dr. Gertjan C. van Baarle and Dr. Alexei Ofitserov of Leiden Probe Microscopy B.V.; the support of the electronics department, especially Ing. Bert Crama, Ing. René Overgauw, Peter J. van Veldhuizen, Ing. Raymond C.T. Koehler, and Ing. Martin J. Moene; scientific support of Marcel B.S. Hesselberth, Dr. Frederica Galli, and Daan Boltje; all my former colleagues from the interface physics group, in particular Dr. Sander B. Roobol, Rik V. Mom, Dr. Violeta Navarro-Paredes, Dirk W. van Baarle, G. Marien Bremmer, Willem G. Onderwaater, Pavel V. Antonov, Dr. Richard van Rijn, Dr. Amir Saedi, Dr. Yuriy I. Yanson, Dr. Petr V. Dudin, Qian Liu, Dr. Ir. Jan Verhoeven, Dr. Femke C. Tabak, Dr. Kees T. Herbschleb; my former collegues of the Oosterkamp group, most notably Jelmer J.T. Wagenaar, J. Marc de Voogd, Bob van Waarde, Martin de Wit, and Prof. Dr. Ir. Tjerk H. Oosterkamp; the (former) staff of the ID3 beamline of the European Synchrotron Radiation Facility in Grenoble, France: Dr. Roberto Felici, Dr. Jakub Drnec, Dr. Francesco Carlà, Dr. Maciej Jankowski, Dr. Helena Isern, and Thomas Dufrane; and other coworkers: Dr. Kees-Jan Weststrate, Prof. Dr. Anja O. Sjåstad, Dr. Angela den Dunnen, Dr. Christina Hahn, Cristina Sfiligoj, and Görsel Yetik.

For the XPS experiments performed on Au(310), Elettra synchrotron, Trieste, Italy, is thanked for the allocation of beam time. Moreover, the help and advice of Dr. Matteo Dalmiglio, Dr. Fabrizio Orlando, Dr. Paolo Lacovig, Prof. Dr. Alessandro Baraldi, and Dr. Silvano Lizzit of the SuperESCA beamline was greatly appreciated.

The travel grant of the Royal Society of Chemistry was highly valued. This grant was used to present my work on CO oxidation over Au(310) at the Gold 2015 conference in Cardiff, the United Kingdom.

List of publications

Peer-reviewed publications

1. M.A. van Spronsen, J.W.M. Frenken, and I.M.N. Groot

   Oxidation of Pt(111) at elevated temperature and high pressure: The formation of novel surface oxides, to be published

2. P.V. Dudin, Y.I. Yanson, N. Vasiljevic, M.T.M. Koper, J.W.M. Frenken, and M.A. van Spronsen

   Gold-coated tungsten tips for imaging in reactive environments with scanning tunneling microscopy, to be published

3. S. B. Roobol, W. G. Onderwaater, M. A. van Spronsen, F. Carla, O. Balmes, V. Navarro, S. Vendelbo, P. J. Kooyman, C. F. Elkjær, S. Helveg, R. Felici, J. W. M. Frenken, and I. M. N. Groot

   Operando studies of NO reduction by H_2 over Pt using surface X-ray diffraction and transmission electron microscopy, to be published

4. J.M. de Voogd, M.A. van Spronsen, O. Ostojić, A.M.J. den Haan, I.M.N. Groot, T.H. Oosterkamp, F.E. Kalff, B. Bryant, A.F. Otte, and M.J. Rost

   Fast and Reliable Pre-Approach for Scanning Probe Microscopes based on Tip-Sample Capacitance, to be published

5. M.A. van Spronsen, C.J. Weststrate, and L.B.F. Juurlink

   The role of water in Au-catalyzed CO oxidation at low-coordination sites, submitted

6. V. Navarro, M.A. van Spronsen, and J.W.M. Frenken

   In situ observation of self-assembled Fischer-Tropsch products on a cobalt catalyst, submitted

7. M.A. van Spronsen, C.J. Weststrate, A. den Dunnen, M.E. van Reijzen, C. Hahn, and L.B.F. Juurlink

Hydrophilic interaction between low-coordinated Au and water: H_2O/Au(310) studied with TPD and XPS

J. Phys. Chem. C. **2016**, *120*, 8693–8703,
http://dx.doi.org/10.1021/acs.jpcc.6b00912

8. M.A. van Spronsen, G.J.C. van Baarle, C.T. Herbschleb, J.W.M. Frenken, and I.M.N. Groot

High-pressure operando STM studies giving insight in CO oxidation and NO reduction over Pt(1 1 0)

Catal. Today **2015**, *244*, 85–95,
http://dx.doi.org/10.1016/j.cattod.2014.07.008

Erratum to "High-pressure operando STM studies giving insight in CO oxidation and NO reduction over Pt(1 1 0)" [Catal. Today 244 (2015) 85–95]

Catal. Today **2015**, *256, Part 2*, 384,
http://dx.doi.org/10.1016/j.cattod.2015.05.002

9. S.B. Roobol, M.E. Cañas-Ventura, M. Bergman, M.A. van Spronsen, W.G. Onderwaater, P.C. van der Tuijn, R. Koehler, A. Ofitserov, G.J.C. van Baarle, and J.W.M. Frenken

The ReactorAFM: Non-contact atomic force microscope operating under high-pressure and high-temperature catalytic conditions

Rev. Sci. Instrum. **2015**, *86*, 033706, http://dx.doi.org/10.1063/1.4916194

10. C.T. Herbschleb, P.C. van der Tuijn, S.B. Roobol, V. Navarro, J.W. Bakker, Q. Liu, D. Stoltz, M.E. Cañas-Ventura, G. Verdoes, M.A. van Spronsen, M. Bergman, L. Crama, I. Taminiau, A. Ofitserov, G.J.C van Baarle, and J.W.M. Frenken

The ReactorSTM: Atomically resolved scanning tunneling microscopy under high-pressure, high-temperature catalytic reaction conditions

Rev. Sci. Instrum. **2014**, *85*, 083703, http://dx.doi.org/10.1063/1.4891811

11. L.R. Baker, G. Kennedy, J.M. Krier, M.A. van Spronsen, R.M. Onorato, and G.A. Somorjai

    The Role of an Organic Cap in Nanoparticle Catalysis: Reversible Restructuring of Carbonaceous Material Controls Catalytic Activity of Platinum Nanoparticles for Ethylene Hydrogenation and Methanol Oxidation

    Catal. Lett. **2012**, *142*, 1286–1294,
    http://dx.doi.org/10.1007/s10562-012-0904-3

12. L.R. Baker, G. Kennedy, M.A. van Spronsen, A. Hervier, X. Cai, S. Chen, L.-W. Wang, and G.A. Somorjai

    Furfuraldehyde Hydrogenation on Titanium Oxide-Supported Platinum Nanoparticles Studied by Sum Frequency Generation Vibrational Spectroscopy: Acid-Base Catalysis Explains the Molecular Origin of Strong Metal-Support Interactions

    J. Am. Chem. Soc. **2012**, *134*, 14208–14216,
    http://dx.doi.org/10.1021/ja306079h

13. M.E. van Reijzen, M.A. van Spronsen, J. Doctor, and L.B.F. Juurlink

    CO and H_2O adsorption and reaction on Au(310)

    Surf. Sci. **2011**, *605*, 1726–1731,
    http://dx.doi.org/10.1016/j.susc.2011.06.006

Other publications, interviews, etc.

1. M.A. van Spronsen, J.W.M. Frenken, and I.M.N. Groot

    De actieve fase van een katalysator bestudeerd met de perfecte combinatie van experimenten onder hoge druk en vacuümtechnologie

    Article competed for the NEVAC Prize, Dutch Vacuum Society (2015)

2. Interviewed for: A. Dijkgraaf, *Inzoomen op de kat*, C2W, Dutch Chemical Society (2015)

Curriculum vitae

Matthijs André van Spronsen was born in Leiderdorp, the Netherlands, on March 8, 1987. He graduated from gymnasium[6] at the Bonaventura College in Leiden in 2005, with a major in the natural sciences. Van Spronsen finished his B.Sc. degree in Chemistry with a research project focusing on the interaction between CO and H atoms towards understanding interstellar methanol formation. This was a theoretical project and a collaboration between the group of Prof. Dr. Ewine F. van Dishoeck and the group of Prof. Dr. Geert-Jan Kroes under the daily supervision of Dr. Stefan Andersson.

Van Spronsen's experimental research project for his M.Sc. degree in Chemistry was conducted in the group of Dr. Ludo B.F. Juurlink and was devoted to the interaction between H_2O and CO on a stepped surface of a Au single crystal. Before graduating cum laude, he spent a semester in the group of Prof. Dr. Gabor A. Somorjai at the University of California, Berkeley and the Lawrence Berkeley National Laboratory in California, the United States of America. In this project, van Spronsen performed a kinetic study to probe the role of the support on Pt nanoparticles in several reactions.

Van Spronsen performed the research for his PhD degree in the group of Prof. Dr. Joost W.M. Frenken in the Leiden Institute of Physics (LION) of Leiden University. After Frenken accepted a position as director of the Advanced Research Center for Nanolithography in 2014, Dr. Irene M.N. Groot started leading the research group and became a copromoter of van Spronsen. The original scope of his PhD project was the combination of in situ STM and AFM. During the project, the scope was widened to incorporate the STM studies in this thesis. Van Spronsen did many chemical experiments using the ReactorSTM. Furthermore, he did experiments at the Elettra Synchrotron, Trieste, Italy under the supervision of Juurlink, his second copromotor.

After defending his PhD thesis, van Spronsen plans to continue his scientific career as a postdoctoral fellow in the group of Prof. Dr. Cynthia M. Friend at Harvard University in Cambridge, Massachusetts, the United States of America.

[6] preuniversity education including ancient Greek

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