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Acknowledgements

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List of publications

• *The active phase of palladium during methane oxidation*,

• *Reversible formation of a PdC\textsubscript{x} phase in Pd nanoparticles upon CO and O\textsubscript{2} exposure*,
  O. Balmes, A. Resta, D. Wermeille, R. Felici, M.E. Messing, K. Deppert, Z. Liu, M.E. Grass, H. Bluhm, R. van Rijn, E. Lundgren, R. Westerström, S. Blomberg, J. Gustafson, and J.N. Andersen,

• *Oxidation and reduction of Pd(100) and aerosol-deposited Pd nanoparticles*,

• *Surface structure and reactivity of Pd(100) during CO oxidation near ambient pressures*,
  R. van Rijn, O. Balmes, A. Resta, D. Wermeille, R. Westerström, J. Gustafson, R. Felici, E. Lundgren, and J.W.M. Frenken,
List of publications

• *Generation of Pd model catalyst nanoparticles by spark discharge*,
  M. E. Messing, R. Westerström, B. O. Meuller, S. Blomberg, J. Gustafson,
  J.N. Andersen, E. Lundgren, R. van Rijn, O. Balmes, H. Bluhm, and K.
  Deppert,

• *A new role for steps in catalysis and reaction oscillations*,
  B. L. M. Hendriksen, M. D. Ackermann, R. van Rijn, D. Stoltz, I. Popa, O.
  Balmes, A. Resta, D. Wermeille, R. Felici, S. Ferrer, and J. W. M. Frenken,

• *Reply to “Comment on ‘Catalytic activity of the Rh surface oxide: CO ox-
  idation over Rh(111) under realistic conditions’ ”*,
  J. Gustafson, R. Westerström, O. Balmes, A. Resta, R. van Rijn, X. Tor-
  relles, C.T. Herbschleb, J. W. M. Frenken, and E. Lundgren,

• *Catalytic activity of the Rh Surface Oxide: CO oxidation over Rh(111) un-
  der realistic conditions*,
  J. Gustafson, R. Westerström, O. Balmes, A. Resta, R. van Rijn, X. Tor-
  relles, C. T. Herbschleb, J. W. M. Frenken, and E. Lundgren,

• *Comment on “CO Oxidation on Pt-Group Metals from Ultrahigh Vacuum to
  Near Atmospheric Pressures. 2. Palladium and Platinum”,*
  R. van Rijn, O. Balmes, R. Felici, J. Gustafson, D. Wermeille, R. Wester-
  ström, E. Lundgren, and J. W. M. Frenken,

• *Ultrahigh vacuum/high-pressure flow reactor for surface x-ray diffraction
  and grazing incidence small angle x-ray scattering studies close to condi-
  tions for industrial catalysis*,
  R. van Rijn, M. D. Ackermann, O. Balmes, T. Dufrane, A. Geluk, H. Gon-
  zalez, H. Isern, E. de Kuyper, L. Petit, V. A. Sole, D. Wermeille, R. Felici,
  and J. W. M. Frenken,
Curriculum vitae

Richard van Rijn was born on July 5, 1983 in Delft. He obtained his VWO diploma from the Westland College in Naalwijk in 2001 and enrolled at Leiden University to study physics. After completing the undergraduate courses in 2005, he started studying the formation and diffusion of single-atom thick gold wires on a gold surface in the framework of a M.Sc. thesis project under the supervision of Dr. M. J. Rost. After this project he spent 5 months assembling, testing and designing parts of a flow reactor for the in situ study of model catalysts with surface x-ray diffraction at the European Synchrotron Radiation Facility (ESRF) in Grenoble, France. This work was done under the supervision of Dr. R. Felici. In 2007 he received his M.Sc. degree (cum laude) in physics from Leiden University.

In September 2007 he continued his work on the flow reactor under the joint supervision of Dr. R. Felici at the ESRF and Prof. dr. J. W. M. Frenken at Leiden University. The research project aimed at developing and using the flow reactor for in situ measurements of heterogeneous model catalysts. The results of this project are described in this thesis.