**Curriculum Vitae**

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## Education

- April 2001, Habilitation in Physik, Thesis title: "Geometric and Electronic Structure of Nanoscale Systems", Universität Dortmund, Germany
- March 1995, Promotion in Physik, Thesis title: "Grenzflächeneigenschaften von Metallclustern" ("*Surface Properties of metal clusters*"), RWTH Aachen, Germany
- January 1991, Diplom in Physik, Thesis title: "Photoakustische Spektroskopie an heterogenen Proben" ("*Photoacoustic Spectroscopy on heterogeneous samples*")

## Professional Positions

- Juli 2005-present, Privatdozent (*Lecturer*) (C2) Experimentelle Physik I, Universität Dortmund, Germany
- April-July 2005, Professor for "Strukturphysik" (Lehrstuhlvertretung W3) Fakultät für Physik, Universität Siegen, Germany
- August 2001-April 2005, Privatdozent (*Lecturer*) (C2) Experimentelle Physik I, Universität Dortmund, Germany
- January 1998-July 2001, Assistant (C1) Experimentelle Physik I, Universität Dortmund, Germany
- April 1996-December 1997, Scientist (BAT IIa) Experimentelle Physik I, Universität Dortmund, Germany
- April 1995-March 1996, Scientist (Feodor Lynen Reasearch Fellow, AvH Foundation) IBM Research Laboratory, Rüschlikon, Switzerland
- February 1991-March 1995, Scientific collaborator, I. Physikalisches Institut, RWTH Aachen, Germany

**Memberships and Honors**

- 2003-present, Referee for programs of the European Science Foundation
- 2000-present, Member of the American Physical Socienty
- 1999-present, Referee for the "Studienstiftung des Deutschen Volkes"
- April 1995-March 1996, Feodor Lynen Research Fellowship, Alexander von Humboldt Foundation
- April 1995, Award "Borchers-Plakette" for the best PhD theses, RWTH Aachen
- November 1991-October 1993, PhD-Fellowship of the "Studienstiftung des Deutschen Volkes"
- November 1991, Award "Springorum Denkmünze" for the best Diploma theses, RWTH Aachen
- 1990-present, Member of the German Physical Society
- April 1986-January 1991, Fellowship of the "Studienstiftung des Deutschen Volkes"
- Referee for several scientific journals (e.g., Journal of Applied Physics, Applied Physics Letters, Physical Review B, Physical Review Letters, Langmuir, The European Physical Journal B, Advanced Functional Materials)

**Research experience**

At the end of my Diploma studies I took special courses in the field of solid-state- and surface-physics. Within my diploma thesis (in the group of P. Grosse) I used IR-photoacoustic spectroscopy for the study of heterogeneous samples ($SiO_2$ powders and Aerogels) and set up a quantitative model for the interpretation of the spectra.

The topic of my PhD work (in the group of U. Kreibig) was the UV/VIS-spectroscopy of plasmon excitations in silver clusters with a size of about 250 atoms. For the first time direct optical extinction measurements were performed for the same clusters in a free beam in vacuum, supported on surfaces and embedded in a matrix. In this way we could prove the strong influence of the surroundings on the cluster-plasmon.

During my research fellowship in the IBM research laboratory in Rüschlikon (in the group of B. Reihl) I worked on the setup of a low-temperature STM together with Omicron Nanotechnology and the University of Rostock. Besides this I began to investigate metal clusters on surfaces using STM and developed the method of "controlled cluster growth in preformed nano-pits".

At the University of Dortmund I planned and installed a surface-science facility and combined my expertise in the field of low-temperature STM with high-resolution photoelectron spectroscopy in a project which was focused on a complete characterization combining both techniques for one and the same sample. With this concept a number of new phenomena emerging for clusters on surfaces could be shown, for example a dynamic final state effect on a femtosecond timescale in the photoemission process, or the existence of quantized Shockley surface states confined to the facets of gold clusters. Further sample systems were rare gas layers (argon, krypton, xenon) on surfaces, a new method for the growth of single-walled carbon nanotubes on a graphite surface with cobalt clusters, and the growth of lead clusters on hydrogen-passivated silicon(111). For Pb/Si(111) the STM measurements were combined with surface X-ray diffraction at the ESRF in Grenoble. Recent projects deal with the deposition of mass selected clusters on surfaces (in cooperation with the University of Freiburg) and new processes using nanolithography with focused ion beams (in cooperation with the Raith GmbH, Dortmund).

**Refereed Publications and Invited Review Articles**

1. H. Hövel, P. Grosse, W. Theiss
„Analysis of photoacoustic IR spectra of aerogel and silica powder“
Journal of Non-Crystalline Solids **145**, 159 (1992)

2. H. Hövel, S. Fritz, A. Hilger, U. Kreibig, M. Vollmer
„Width of cluster plasmon resonances: Bulk dielectric functions and chemical interface damping“
Physical Review B **48**, 18178 (1993)

3. U. Kreibig, A. Hilger, H. Hövel, M. Quinten
„Optical Properties of free and embedded metal clusters: Recent results“
in: „Large Clusters of Atoms and Molecules“, ed. T.P. Martin,
(Kluwer, 1996), 475

4. U. Kreibig, M. Gartz, A. Hilger, H. Hövel
„Mie-plasmon spectroscopy: A tool of surface science“
in: „Fine Particles Science and Technology“, ed. E. Pelizzetti,
(Kluwer, 1996), 499

5. A. Relitzki, A. Hilger, H. Hövel, U. Kreibig, D. Schumacher, H. Winkes
„Deposition of silver clusters on silver surfaces: Influences on the electrical resistance“
in: „Science and Technology of Atomically Engineered Materials“,
eds. P. Jena, S.N. Khanna, B.K. Rao (World Scientific, Singapore, 1996), 453

6. U. Kreibig, M. Gartz, A. Hilger, H. Hövel
„Surface analysis by cluster-plasmon spectroscopy“
in: „Science and Technology of Atomically Engineered Materials“,
eds. P. Jena, S.N. Khanna, B.K. Rao (World Scientific, Singapore, 1996), 403

7. H. Hövel, Th. Becker, A. Bettac, B. Reihl, M. Tschudy, E.J. Williams
„Controlled cluster condensation into preformed nanometer-sized pits“
J. Appl. Phys. **81**, 154 (1997)

8. H. Hövel, Th. Becker, A. Bettac, B. Reihl, M. Tschudy, E.J. Williams
„Crystalline structure and orientation of gold clusters grown in preformed nanometer-sized pits“
Appl. Surf. Sci. **115**, 124 (1997)

9. H. Hövel, A. Hilger, I. Nusch, U. Kreibig
„Experimental determination of deposition induced cluster deformation“
Z. Phys. D **42**, 203 (1997)

10. T. Becker, H. Hövel, M. Tschudy, B. Reihl
„Applications with a new Low-Temperature UHV STM at 5K“
Appl. Phys. A **66**, S27 (1998)

11. H. Hövel, T. Becker, D. Funnemann, B. Grimm, C. Quitmann, B. Reihl
„High-Resolution Photoemission Combined with Low-Temperature STM“
J. Electron Spectros. Rel. Phenom. **88-91**, 1015 (1998)

12. U. Kreibig, M. Gartz, A. Hilger, H. Hövel
„Optical Inverstigations of Surfaces and Interfaces of Metal Clusters“
in: „Advances in Metal and Semiconductor Clusters, Vol. 4, Cluster Materials“, ed. M. A. Duncan,
(JAI Press, 1998), 345

13. H. Hövel, B. Grimm, M. Pollmann, B. Reihl
„Cluster-Substrate Interaction on a Femtosecond Timescale Revealed by a High-Resolution Photoemission Study of the Fermi-Level Onset“
Phys. Rev. Lett. **81**, 4608 (1998)

14. H. Hövel, B. Grimm, M. Pollmann, B. Reihl
„Femtosecond dynamics of final-state effects in the valence band photoemission of silver clusters“
The European Physical Journal D**9**, 595 (1999)

15. B. Grimm, H. Hövel, M. Pollmann, B. Reihl
„Physisorbed Rare-Gas Monolayers: Evidence for Domain-Wall Tilting“
Phys. Rev. Lett. **83**, 991 (1999)

16. H. Hövel, L.S.O. Johansson, B. Reihl
„Fundamentals of Adsorbate-Surface Interactions“
in: „Metal Clusters at Surfaces“, ed. K.H. Meiwes-Broer,
Springer Series in Cluster Physics (2000), 37

17. B. Grimm, H. Hövel, M. Bödecker, K. Fieger, B. Reihl
„Observation of Domain-Wall Dynamics in Rare-Gas Monolayers at T = 5 K“
Surf. Sci. **454-456**, 618 (2000)

18. H. Hövel, B. Grimm, M. Bödecker, K. Fieger, B. Reihl
„Tunneling spectroscopy on silver clusters at T = 5 K: size dependence and spatial energy shifts“
Surf. Sci. **463**, L603 (2000)

19. H. Hövel
„Clusters on surfaces: High resolution spectroscopy at low temperatures“
Appl. Phys. A **72**, 295 (2001)

20. H. Hövel, B. Grimm, B. Reihl
„Modification of the Shockley-Type Surface State on Ag(111) by an Adsorbed Xenon Layer“
Surf. Sci. **477**, 43 (2001)

21. C. Kennerknecht, H. Hövel, M. Merschdorf, S. Voll, W. Pfeiffer
„Surface plasmon assisted photoemission from Au nanoparticles on Graphite“
Appl.Phys.B **73**, 425 (2001)

22. H. Hövel, M. Bödecker, B. Grimm, C. Rettig
„Growth mechanisms of carbon nanotubes using controlled production in ultrahigh vacuum“
J. Appl. Phys. **92**, 771 (2002)
(selected for the July 8, 2002 issue of the Virtual Journal of Nanoscale Science & Technology)

23. C. Rettig, M. Bödecker, H. Hövel
„Carbon-nanotubes on graphite: alignment of lattice structure“
J. Phys. D: Appl. Phys. **36**, 818 (2003)

24. I. Barke, H. Hövel
„Confined Shockley surface states on the (111) facets of gold clusters“
Phys. Rev. Lett. **90**, 166801 (2003)
(selected for the May 5, 2003 issue of the Virtual Journal of Nanoscale Science & Technology)

25. H. Hövel, I. Barke
„Large noble metal clusters: electron confinement and band structure effects“
New J. Phys. **5**, 31 (2003)

26. H. Hövel, I. Barke, H.-G. Boyen, P. Ziemann, M.G. Garnier, P. Oelhafen
„Photon energy dependence of the dynamic final-state effect for metal clusters at surfaces“
Phys. Rev. B **70**, 045424 (2004)

27. Thomas Andreev, Ingo Barke, Heinz Hövel
„Adsorbed rare-gas layers on Au(111): Shift of the Shockley surface state studied with ultraviolet photoelectron spectroscopy and scanning tunneling spectroscopy“
Phys. Rev. B **70**, 205426 (2004)

28. M. Paulus, R. Fendt, C. Sternemann, C. Gutt, H. Hövel, M. Volmer, M. Tolan, K. Wille
„An internet-based synchrotron experiment for students measuring the X-ray magnetic circular dichroism of a PtFe alloy“
Journal of Synchrotron Radiation, **12**, 246 (2005)

29. T. Irawan, I. Barke, H. Hövel
„Size dependent morphology of gold clusters grown on nanostructured graphite“
Appl. Phys. A **80**, 929 (2005)

30. Marina Pivetta, Francois Patthey, Ingo Barke, Heinz Hövel, Bernard Delley, Wolf-Dieter Schneider
„Gap opening in the surface electronic structure of graphite induced by adsorption of alkali atoms“
Phys. Rev. B **71**, 165430 (2005)

31. T. Irawan, D. Boecker, F. Ghaleh, C. Yin, B. v.Issendorff, H. Hövel
„Metal clusters on rare gas layers - growth and spectroscopy“
Appl. Phys. A **82**, 81 (2006)

32. Heinz Hövel, Ingo Barke
„Morphology and electronic structure of gold clusters on graphite: scanning-tunneling techniques and photoemission “
Progress in Surface Science, **81**, 53 (2006)

33. F. Ghaleh, R. Köster, H. Hövel, L. Bruchhaus, S. Bauerdick, J. Thiel, R. Jede
„Controlled fabrication of nanopit-patterns on a graphite surface using focused ion beams and oxidation“
J. Appl. Phys., 101, 044301 (2007)

34. H. Hövel, M. De Menech, M. Bödecker, C. Rettig, U. Saalmann, M. E. Garcia
„Tip-induced distortions in STM imaging of carbon nanotubes“
The European Physical Journal D, 45, 459 (2007)

35. S. Duffe, T. Irawan, M. Bieletzki, T. Richter, B. Sieben, C. Yin, B. von Issendorff, M. Moseler, H. Hövel
„Softlanding and STM imaging of Ag561 clusters on a C60 monolayer“
The European Physical Journal D, 45, 401 (2007)

36. M. Rohmer, F. Ghaleh, M. Aeschlimann, M. Bauer, H. Hövel
„Mapping the femtosecond dynamics of supported clusters with nanometer resolution“
The European Physical Journal D, 45, 491 (2007)

37. S. Duffe, N. Grönhagen, L. Patryarcha, B. Sieben, C. Yin, B. von Issendorff, M. Moseler, H. Hövel
„Penetration of thin C60 films by metal nanoparticles“
Nature Nanotechnology, published online April 2010, DOI: 10.1038/NNANO.2010.45

38. B. Wortmann, K. Mende, S. Duffe, N. Grönhagen, B. von Issendorff, H. Hövel
”Ultraviolet photoelectron spectroscopy of supported mass selected silver clusters”
Phys. Status Solidi B, published online March 2010, DOI: 10.1002/pssb.200945586

**Research Presentations**

- Total: 165
- Conference presentations: 98
- Plenary talks: 17 on national, 14 on international meetings

**Present Collaboration Partners**

- B. v.Issendorff,
  (Univ. Freiburg)
- Raith GmbH (Dortmund)
- M. Moseler
  (Fraunhofer IWM, Freiburg)
- A. Enders
  (University of Nebraska-Lincoln, USA)
- Omicron Nanotechnology GmbH (Taunusstein)

**External Funding**

- "Nanostructures production using FIB" (Raith GmbH), 3 years, (running)
- "Free and deposited mass selected clusters" (DFG, SPP), 6 years, (running)
- "Single-electron effects" (DFG, GK), 3 years, (finished)
- "Superconducting nanostructures" (DFG, GK), 2 years, (finished)
- "Cluster-surface interaction" (DFG), 2 years, (finished)

**Teaching Experience**

- 2001-present, Universität Dortmund, (besides other teaching duties) following lectures (German lecture titles translated):
  - 2002-2009, "Methods for surface analysis with atomic resolution: STM and X-ray scattering" (in cooperation with M.Tolan), 3 hours/week
  - 2003, "The structure of matter" (a compact course covering topics from high-energy physics to solid-state physics for physics teachers), 4 hours/week
- 2005, Universität Siegen, Lecture during my employment as professor in the faculty of Physics, "Solid-state physics", 7 hours/week
- 2003-2004, Universität Dortmund, Work on the design and set-up of the an internet-based synchrotron experiment for students measuring the X-ray magnetic circular dichroism of a PtFe alloy (see no. 28 in the publication list) within a BMBF project
- 1996-2001, Universität Dortmund, Teaching assistant: basic and advanced laboratory courses for students, seminars, tutorials, set-up of the new experiment (STM) for the advanced laboratory course
- 1991-1994, RWTH Aachen: Teaching assistant: laboratory courses for students, seminars, tutorials and experiments for lectures

**Students' theses supervised**

- Universität Dortmund (after 2001, acting also as first referee)
    - Diploma theses: Ingo Barke, Christian Rettig, Thomas Andreev, Thomas Irawan, Daniel Boecker, Farhad Ghaleh, Stefanie Krause/Duffe, Markus Bieletzki, Robert Köster, Torsten Richter, Benedikt Sieben, Lukas Patryarcha, Niklas Grönhagen, Sabrina Hennes, Ben Wortmann, Stefan Balk, Kolja Mende, Natalie Miroslawski, Karl Bauer
    - PhD theses: Ingo Barke, Christian Rettig, Thomas Irawan, Farhad Ghaleh, Stefanie Duffe, Niklas Grönhagen, Lukas Patryarcha, Lars Bruchhaus, Sabrina Hennes
- Universität Dortmund (before 2001)
    - Diploma theses: Marco Schaffhöfer, Michael Pollmann, Kristina Fieger, Mirko Bödecker
    - PhD thesis: Burkhard Grimm
- RWTH Aachen
    - Diploma theses: Stefan Fritz, Almuth Hilger, Isa Nusch, Markus Pidun

**Mentoring and public outreach activities**

- Organization of the NRW surface-science meeting 2006.
- Organization of the "Autumn Academy" 2005 and 2006 in which last year pupils get to know the faculty of physics
- Four lectures set up for the "Saturday Morning Physics" program of the faculty, but given also on other occasions: one on the topic nano-physics, one showing optical phenomena in the atmosphere, one on the physics of clouds, and one on cluster physics
- Mentor for the Faculty of Physics in the program "Jugend Forscht" (research projects for pupils)
- Regular contributions to public outreach activities like open campus days