

Research Profile of Wolfgang M. Heckl

Date of Birth: September 10th, 1958
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Education

1978 - 1985: Studies of physics at the the TU München
March 1985: Diploma in physics, Technische Universität München
Feb. 1988: Ph. D. in physics, Technische Universität München
Mai. 1993: Habilitation in experimental physics, Technische Universität München

Professional Experience

1988-1989: Teaching und Research Assistant, University of Toronto, Canada
1989-1990: Post doc at IBM Research, Physics Group, (with Prof. G. Binnig)
1990-1993: Wissenschaftlicher Assistent und Rat, LMU München (with Prof. T. Hänsch)
Since 1993: Professor (C3) for Experimental Physics
(emphasis: Experimental Solid State Physics),
Department for Geoscience, Ludwig-Maximilians-Universität München
Since 1999: Full member of the Center for NanoScience (CeNS),
Ludwig-Maximilians-Universität München
Since 2002: Founding member of GeoBioCenter^{LMU}, LMU München
Since 2002: Founder and spokesman of the Excellence Network Nanobiotechnology
München
Since 2004 Member of the Impulskreis Nanowelten of the Federal Government of Germany
Since 2004: Generaldirektor of Deutsches Museum, München

Academic Interests

Experimental solid state physics – Molecular organic/bio systems
Electronic, optical and mechanical properties of nanoscale systems
Methods of nanostructure fabrication,
Self Assembly of molecular nanostructures

International Activities

Advisory Board of Small
Advisory Board of Single Molecules
Scientific Advisory Board NANOMAT
The Research Council of Norway

Awards

1978-1980 Siemens student scholarship for best matriculation
1978-87 Bavarian Government scholarship for best final exam
1993 Philip Morris Research Award „*First real space images of 4 DNA-bases with Scanning Tunneling Microscope*“
2001 Call for a full professor position to the University of Tokyo
2002 Communicator-Prize of the German Research Society for outstanding achievements in the field of Public Understanding of Science
2004 Descartes Prize for Science Communication of the European Community

Selected Publications:

1. **Scanning Probe microscopy studies of the surface of decagonal quasicrystals in ambient conditions**, T. Drobek and W. M. Heckl, *Materials Science and Engineering A*, 294-296(2000)878-881
2. **Noncontact scanning force microscopy based on a modified tuning force sensor**, H. Göttlich, R. Stark and W.M. Heckl, *Review of Scientific Instruments*, 71, 3104-3107(2000)
3. **Fourier transformed atomic force microscopy: tapping mode atomic force microscopy beyond the Hookian approximation**, R.W. Stark und W. M. Heckl, *Surface Science* 457, 219-228 (2000)
4. **Atomic Force Microscopy for High Resoluiton Imaging of Collgagen Fibrills - A New Technique to Investigate Collagen Structure in Historic Bone Tissues**, S. Thalhammer, A.Zink ,G. Nerlich and W.M. Heckl, *Journal of Archeological Science*, 28,1061-1068(2001)
5. **Scaling-Index Method as an Image Processing Tool in Scanning Probe Microscopy**, F. Jamitzky, R.W.Stark, W. Bunk, S. Thalhammer, C. R ath, T. Aschenbrenner, G.E. Morfill and W. M. Heckl, *Ultramicroscopy*, 86(2001)241-246
6. **Spectroscopy of the anharmonic cantilever oscillations in tapping-mode atomic force microscopy**, M. Stark, R.W. Stark, W.M.Heckl and R. Guckenberger, *Applied Physics Letters*, 77, (2000) 3293-3295
7. **Differential Adsorption of Nucleic Acid Bases: Relevance to Primitive Information Systems**, S.J. Sowerby, C. A. Cohn, W. M. Heckl and N. G. Holm, *Proceedings of the National Academy of Sciences, USA*, 98.3(2001)820-822
8. **Combining photonic and mechanical nanomanipulation for the collection of biological material**, R. Stark, S.Thalhammer, F.J. Rubio-Sierra, W.M. Heckl, *European Biophysics Journal*, Vol. 29, number 4-5, 12D-4 (2000)
9. **Determiation of shear-stiffness based on thermal noise analysis in atomic-force microscopy: Passive overtone microscopy**, T. Drobek, R.W. Stark and W.M.Heckl, *Physical Review B*, 64, 045401, (2001)
10. **STM structure determination of adenine-bilayers by Moir  interpretation**, M. M. Reiter, F. Jamitzky, F. Trixler and W. M. Heckl, *Physika Status Solidi*, 187,1(2001)
11. **Self-Assembled Two -Dimensional Molecular Host-Guest Architectures From Trimesic Acid** Stefan Griessl, Markus Lackinger, Michael Edelwirth, Michael Hietschold and Wolfgang M. Heckl, *Single Mol.*3.1,25-31(2002)
12. **Inverting dynamic force microscopy: From signals to time-resolved interaction forces**, M. Stark, R.W. Stark, W.M.Heckl, R. Guckenberger, *PNAS*, 99.no13,8473-8478 (2002)
13. **Coronene on Ag(111) investigated by LEED and STM in UHV**, Markus Lackinger, Stefan Griessl, Wolfgang M. Heckl, Michael Hietschold, *J. Phys. Chem. B*, 106,4482-4485(2002)
14. **Atomic Force Microscopy of Precambrian Microscopic Fossils**, Kempe, A., Schopf, J.W., Altermann, W., Kudryavtsev, A.B., Heckl, W. M., *Proceedings of the National Academy of Sciences of the USA*, Vol 99.14, 9117-9120(2002)
15. **STM and STS of coronene on HOPG(001) in UHV – adsorption of the smallest possible graphite flakes on graphite**, M. Lackinger, S Griessl, W.M.Heckl, M Hietschold, *Analytical and Bioanalytical Chemistry*, 374, 685-687(2002)
16. **Force Feedback Joystick as a low cost haptic interface for an atomic force microscopy nanomanipulator**, F.J. Rubio-Sierra, R.W.Stark, S. Thalhammer and W.M.Heckl, *Applied Physics A*, 2003

17. **Scanning Tunneling Microscopy in Microgravity**, T. Drobek, M. Reiter and W.M. Heckl, Applied Surface Science, T. Drobek, M. Reiter and W.M. Heckl, 238(2004) 3-8
18. **Combined nanomanipulation by atomic force microscopy and UV-laser ablation for chromosomal dissection**, R. Stark, F.J. Rubio-Sierra, S. Thalhammer and W.M. Heckl, Europ Biophys Journal, Vol. 32, 33-39 (2003)
19. **Rapid Selection of Chloroplasts by Laser Microbeam Microdissection for Single-Chloroplast PCR**, H. Meimberg, S. Thalhammer, A. Brachmann, B. Müller, L. Eichacker, W. M. Heckl and G. Heubl, BioTechniques, Vol 34, No.6, 1238-1243 (2003)
20. **Higher Harmonic Imaging in Tapping Mode Atomic Force Microscopy**, R.W. Stark and W. M Heckl, Rev. Scie. Instr., 74.12.5111-5114.(2003)
21. **Atomic Force Microscopy as a tool in Nanobiology: Part I: Imaging and Manipulation in Cytogenetics**, S. Thalhammer and W.M.Heckl, Cancer Genomics and Proteomics, 1: 59-70 (2004)
22. **Atomic Force Microscopy as a tool in Nanobiology: Part II: Force Spectroscopy in Genomics and Proteomics**, L. T. Costa, S. Thalhammer and W.M.Heckl, Cancer Genomics and Proteomics, 1: 71-76 (2004)
23. **Discrimination of Aqueous and Aeolian Paleoenvironments by Atomic Force Microscopy – A Database for the Characterization of Martian Sediments** Kempe, A. Jamitzky, F. Altermann, Baisch, B., Markert, T. and W.M. Heckl, Astrobiology, 4, 51-64(2004)
24. **LexA-DNA Bond Strength by Single Molecule Force Spectroscopy**, F. Kühner, L.T. Costa, P.M. Bisch, S. Thalhammer, W.M.Heckl, H.E.Gaub, Biophys. J, 87,2683-2690 (2004)
25. **Room Temperature STM Manipulation of Single C60 Molecules at the Liquid Solid Interface - Playing Nano-Soccer**, Stefan J.H. Griessl, Markus Lackinger, Ferdinand Jamitzky, Thomas Markert, Michael Hietschold and Wolfgang M. Heckl, Journal of Physical Chemistry B, 108, 11556 (2004)
26. **Incorporation and Manipulation of Coronene in an Organic Template Structure – Single Molecular Rotation**, Stefan J.H. Griessl, Markus Lackinger, Ferdinand Jamitzky, Thomas Markert, Michael Hietschold and Wolfgang M. Heckl, Langmuir, 20, 9403 (2004)
27. **Self-Assembly of benzene-dicarboxylic acid isomers at the liquid solid interface – steric aspects of hydrogen-bonding**, M. Lackinger, J.H. Griessl, T. Markert, F. Jamitzky, and W. M. Heckl, J. Phys.Chem B, submitted
28. **Dynamics of Grain Boundaries in Two-Dimensional Hydrogen-Bound Molecular Networks**, M. Lackinger, S. Griessl, L. Kampschulte, F. Jamitzky and W.M. Heckl, Small 1, 532-539 (2005)
29. **Solvent Induced Polymorphism of Benzene-Tri-Benzoate on Graphite Surfaces – a New Template Structure**, S. Griessl, M. Lackinger, A.-K. Maier, V. Kalsani, L. Kampschulte, M. Schmittel and W.M. Heckl, submitted to Chem. Eur. J.
30. **Self-assembly of trimesic acid at the liquid-solid interface - a study of solvent induced polymorphism** Langmuir 21, Lackinger, M.; Griessl, S.; Heckl, W.M.; Hietschold, M.; Flynn, G.W., 4984-4988 (2005)
31. **Mediated Co-Adsorption at the Liquid-Solid Interface - Stabilization through Hydrogen-Bonds** J. Phys. Chem. B 109, Kampschulte, L.; Griessl, S.; Heckl, W.M.; Lackinger, M., 14074-14078
32. **Solvent Induced Polymorphism of Benzene-Tri-Benzoate on Graphite Surfaces - a New Template Structure - submitted to Chem. Eur. J.**, Griessl, S.; Lackinger, M.; Maier, A.-K.; Kalsani, V.; Kampschulte, L.; Schmittel, M.; Heckl, W.M. -

33. **Spontaneous Formation of Nucleic Acid-based Nanoparticles Is Responsible for High Interferon- Induction by CpG-A in Plasmacytoid Dendritic Cells.** *J. Biol. Chem.* M. Kerkmann, L. T. Costa, C. Richter, S. Rothenfusser, J. Battiany, V. Hornung, J. Johnson, S. Englert, T. Ketterer, W.M. Heckl, S. Thalhammer, S. Endres, and G. Hartmann (2005): 280: 8086 - 8093
34. **Microdissection and development of genetic probes using Atomic Force Microscopy in Nanotechnology in Biology and Medicine: Methods, Devices, and Applications**, S. Thalhammer and W.M.Heckl (2005): CRC Press, ISBN:849329493
35. **Isolation of ancient DNA using laser based microisolation and atomic force microscopy.** *Journal of forensic Sciences*, S. Thalhammer, A. Zink, A.G. Nerlich, W.M. Heckl (2005): eingereicht
36. **Nanotechnology and Medicine. In "Extending the Lifespan"** S. Thalhammer and W.M. Heckl (2005) DGGS Sektion 1 239-244, LIT Verlag Münster ISBN 3-8258-563-1
37. **Manipulation of genetic material.** S. Thalhammer and W.M.Heckl (2005): Nano Today, May: 40- 49
38. **Automated dialysis system to control the pH-value during collagen self assembly.** S. Strasser, A. Zink, W.M. Heckl, S. Thalhammer (2005): J. of Biomechanical Engineering, eingereicht
39. **Age determination of blood spots in forensic medicine by force spectroscopy.** S. Strasser, A. Zink, G. Kada, P. Hinterdorfer, O. Peschel, W.M. Heckl, A.G. Nerlich, S. Thalhammer (2005): International Journal of Molecular Medicine
40. **Focussed Ion Beam Preparation and in Situ Nanoscopic Study of Precambrian Acritarchs**, Kempe, R. Wirth, W. ?Altermann, R. W. Stark, J. W. Schopf, W. M. Heckl (2005): Precambrian Research, 140, pp. 36-54
41. **Nanomanipulation by Atomic Force Microscopy**, F.J. Rubio-Sierra, W. M. Heckl, R. W. Stark (2005): Adv. Eng. Materials, 7 (4), p. 193-196