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PERSONAL DETAILS

Date of birth: 23.01.1968
Private address: Oswald-Kunzemann-Str. 9, D-97299 Zell a.M., Germany
Nationality: German
Marital status: married, 2 sons, 1 daughter

CURRICULUM VITAE

since 01.10.06 **Associate Professor** (W2), Institute of Physics and Astronomy,
Department of Experimental Physics V, University of Würzburg,
Germany

01.10.01 **Research Professorship of the Swiss National Science Foundation**¹
- 30.09.06 Institute of Physics, University of Basel, Member of the National
Competence Center for Research in 'Nanoscale Science'

10.2004 *Venia docendi*, Experimental Physics/Optics, University of Basel

09.96 - 09.01 **Postdoc and Habilitation**, *Venia legendi*, Physical Chemistry, ETH
Zürich. Prof. Dr. U.P. Wild.
Habilitation thesis: "Nanoscopic Interactions probed by Single
Molecules"².

02.93 - 08.96 **PhD**, IBM Research Laboratory Rüschlikon / University of Basel, Dr.
D.W. Pohl / Prof. Dr. H.J. Güntherodt
PhD thesis: "Forbidden Light Scanning Near-Field Optical
Microscopy" (summa cum laude)

10.87 - 01.93 **Diploma in Physics**, University of Konstanz.
Diploma thesis: "Mikroskopie und Spektroskopie im Optischen
Nahfeld" (sehr gut)
Prof. Dr. O. Marti / Prof. Dr. J. Mlynek

¹ www.snf.ch/en/fop/awa/awa_pfs.asp

² <http://e-collection.ethbib.ethz.ch/cgi-bin/show.pl?type=habil&nr=3>

PUBLICATIONS

1. Near-Field Optical Measurement of the Surface Plasmon Field.
O. Marti, H. Bielefeldt, **B. Hecht**, S. Herminghaus, P. Leiderer, and J. Mlynek,
Optics Commun. **96** (1993) 225-228.
2. Direct Measurement of the Field Enhancement Caused by Surface Plasmons with the Scanning Tunneling Optical Microscope.
H. Bielefeldt, **B. Hecht**, S. Herminghaus, J. Mlynek, and O. Marti
in *Near Field Optics*, edited by D.W. Pohl and D. Courjon,
NATO ASI Series **242** (Kluwer, Dordrecht, 1993) 281-286.
3. Near-Field Optical Spectroscopy of Individual Molecules in Solids.
W.E. Moerner, T. Plakhotnik, T. Irgangtinger, U.P. Wild, D.W. Pohl, **B. Hecht**
Phys. Rev. Lett. **73**(20) (1994) 2764-2767.
4. Combined Aperture SNOM/PSTM: The Best of Both Worlds?
B. Hecht, H. Heinzelmann, and D.W. Pohl
Ultramicroscopy **57**(2/3) (1995) 228-234.
5. Forbidden Light Scanning Near-Field Optical Microscopy.
H. Heinzelmann, **B. Hecht**, L. Novotny, and D.W. Pohl
J. Microscopy **177** (1995) 115-118.
6. 'Tunnel' Near-Field Optical Microscopy: TNOM-2.
B. Hecht, D.W. Pohl, H. Heinzelmann, and L. Novotny
in *Photons and Local Probes*, edited by O. Marti and R. Möller (Kluwer, Dordrecht, 1995) 93-107.
7. Tunnel Near-Field Optical Microscopy: TNOM-2.
B. Hecht, D.W. Pohl, H. Heinzelmann, and L. Novotny
in *Near-Field Optics*, edited by M.A. Paesler and P.J. Moyer, Vol. **2535** (SPIE, Bellingham, 1995) 61-68.
8. Scanning Near-Field Optical Microscopy in Basel, Rüslikon and Zurich.
H. Heinzelmann, Th. Huser, Th. Lacoste, H.-J. Güntherodt, D.W. Pohl, **B. Hecht**, L. Novotny, O.J.F. Martin, Ch. Hafner, H. Baggenstos, U.P. Wild, and A. Renn
Optical Engineering **34**(8) (1995) 2441-2545.
9. Scanning Near-Field Optical Probe with Ultrasmall Spot Size.
L. Novotny, D.W. Pohl, and **B. Hecht**
Opt. Lett. **20**(9) (1995) 970-972.
10. Light Confinement in Scanning Near-Field Optical Microscopy.
L. Novotny, D.W. Pohl, and **B. Hecht**
Ultramicroscopy **61**(1-4) (1995) 1-9.
11. 'Tunnel' Near-Field Optical Microscopy: TNOM-2.
B. Hecht, D. Pohl, H. Heinzelmann, and L. Novotny
Ultramicroscopy **61**(1-4) (1995) 99-104.
12. Piezoresistive Cantilevers as Optical Sensors for Scanning Near-Field Microscopy.
P. Bauer, **B. Hecht**, and C. Rossel
Ultramicroscopy **61**(1-4) (1995) 127-130.
13. Local Excitation of Surface Plasmons by TNOM.
B. Hecht, D.W. Pohl, and L. Novotny
in *Optics at the Nanometer Scale: Imaging and Storing with Photonic Near Fields*, M. Nieto-Vesperinas and N. Garcia (eds.), NATO ASI Series E (Kluwer, Dordrecht, 1996) 151-161.

14. Instrumental Developments and Recent Experiments in Near-Field Optical Microscopy.
H. Heinzlmann, Th. Lacoste, Th. Huser, H.J. Güntherodt, **B. Hecht**, and D.W. Pohl
Thin Solid Films **273** (1996) 149-153.
15. Radiation Coupling and Image Formation in Scanning Near-Field Optical Microscopy.
D.W. Pohl, L. Novotny, **B. Hecht**, and H. Heinzlmann
Thin Solid Films **273** (1996) 161-167.
16. Local Excitation, Scattering, and Interference of Surface Plasmons.
B. Hecht, H. Bielefeldt, L. Novotny, Y. Inouye, and D.W. Pohl
Phys. Rev. Lett. **77** (1996) 1889-1892.
17. Facts and Artifacts in Near-Field Optical Microscopy.
B. Hecht, H. Bielefeldt, Y. Inouye, L. Novotny, and D.W. Pohl
J. Appl. Phys. **81**(6) (1997) 2492-2498.
18. Interference of locally excited surface plasmons.
L. Novotny, **B. Hecht**, and D.W. Pohl
J. Appl. Phys. **81**(4) (1997) 1798-1806.
19. Quo Vadis, Near-Field Optics?
D.W. Pohl, **B. Hecht**, and H. Heinzlmann
Proceedings of the Nato Forum on "Nanoscale Science and Technology",
N. Garcia , M. Nieto-Vesperinas, and H. Rohrer (eds.), Toledo, Spain, 11-16 May 1997, NATO
ASI Series E: Applied Sciences **348** (1998) 175 (Kluwer Academic Publishers).
20. Optical Microscopy in the Nano-World.
D.W. Pohl, **B. Hecht** et al.
Chimia **51**(10) (1997) 760-767.
21. Implications to high resolution in near-field optical microscopy.
L. Novotny, **B. Hecht**, and D.W. Pohl
Ultramicroscopy **71** (1998) 341-344.
22. Influence of Detection Optics on Near-field Optical Imaging.
B. Hecht, H. Bielefeldt, L. Novotny, H. Heinzlmann, and D.W. Pohl
J. Appl. Phys. **84**(11) (1998) 5873-5882.
23. Einzelne Moleküle im Brennpunkt.
B. Hecht, B. Sick und U.P. Wild
Bulletin ETHZ **269** (1998) 44-47.
24. High Photo-stability of Single Molecules in an Organic Crystal at Room Temperature observed
by Scanning Confocal Optical Microscopy.
L. Fleury, B. Sick, G. Zumofen, **B. Hecht**, and U.P. Wild
Mol. Phys. **95**(6) (1998) 1333-1338.
25. High-quality Near-Field Optical Probes by Tube Etching.
R. Stöckle, C. Fokas, V. Deckert, R. Zenobi, B. Sick, **B. Hecht**, and U.P. Wild
Appl. Phys. Lett. **75**(2) (1999) 160-162.
26. Non-classical Photon Statistics in Single-Molecule Fluorescence at Room Temperature.
L. Fleury, J.M. Segura, G. Zumofen, **B. Hecht**, and U.P. Wild
Phys. Rev. Lett. **84**(6) (2000) 1148.
27. Deformation-induced Formation of Polymer Molecular Blends probed by Single-Molecule
Microscopy.
W. Trapesinger, A. Renn, A. Montali, P. Smith, C. Weder, **B. Hecht**, and U.P. Wild,
J. Phys. Chem. B **104** (2000) 5221.

28. A Sample-Scanning Confocal Optical Microscope for Cryogenic Operation.
J.-M. Segura, A. Renn, and **B. Hecht**
Rev. Sci. Instrum. **71**(4) (2000) 1706.
29. Scanning Near-Field Optical Microscopy with Aperture Probes: Fundamentals and Applications.
B. Hecht, B. Sick, U.P. Wild, V. Deckert, R. Zenobi, O.J.F. Martin, and D.W. Pohl
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30. Single-Molecule Identification by Spectrally and Time-Resolved Fluorescence Detection.
M. Prummer, C. Hübner, B. Sick, **B. Hecht**, A. Renn, and U.P. Wild
Anal. Chem. **72** (2000) 443.
31. Phase Behavior and Anisotropic Optical Properties of Photoluminescent Polarizers.
A. Montali, A. Palmans, M. Eglin, C. Weder, P. Smith, W. Trabesinger, A. Renn, **B. Hecht**, U.P. Wild
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32. Orientational Imaging of Single Molecules by Annular Illumination Scanning Confocal Optical Microscopy.
B. Sick, L. Novotny, **B. Hecht**,
Phys. Rev. Lett. **85** (2000) 4482.
33. Optical Microscopy of Single Ions and Morphological Inhomogeneities in Samarium-doped CaF₂ Thin Films.
R. Rodrigues-Herzog, F. Trotta, H. Bill, H.J. Güntherodt, J.-M. Segura and **B. Hecht**
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34. Statistical Analysis of Single-Molecule Colocalization Assays.
W. Trabesinger, **B. Hecht**, U.P. Wild, G.J. Schütz, H.J. Schindler and T. Schmidt
Anal. Chem. **73** (2001) 1100-1105.
35. Probing Confined Fields with Single Molecules and *Vice Versa*.
B. Sick, L. Novotny, **B. Hecht**, U.P. Wild,
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36. Molecular Rearrangements observed by Single-Molecule Microscopy.
W. Trabesinger, A. Renn, **B. Hecht**, U. P. Wild, A. Montali, P. Smith, Ch. Weder
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37. Tip-induced Spectral Dynamics of Single Molecules.
J.-M. Segura, G. Zumofen, A. Renn, **B. Hecht**, and U.P. Wild
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38. Photon statistics in single-molecule fluorescence at room temperature.
L. Fleury, J.M. Segura, G. Zumofen, **B. Hecht**, and U.P. Wild
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39. Single-Molecule Near-Field Optical Energy Transfer Microscopy.
W. Trabesinger, M. Kreiter, A. Kramer, **B. Hecht**, and U.P. Wild
Appl. Phys. Lett. **81** (2002) 2118-2120.
40. Continuous realtime measurements of fluorescence lifetimes.
W. Trabesinger, C.G. Hübner, **B. Hecht**, and U.P. Wild
Rev. Sci. Instrum. **73** (2002) 3122-3124.
41. Optical near-field enhancement at a metal tip probed by a single fluorophore.
A. Kramer, W. Trabesinger, **B. Hecht** and U.P. Wild
Appl. Phys. Lett. **80** (2002) 1652-1654.

42. A cryogenic scanning near-field optical microscope with shearforce gapwidth control.
A. Kramer, J.-M. Segura, A. Hunkeler, A. Renn, and **B. Hecht**
Rev. Sci. Instrum. **73** (2002) 2937-2941.
43. Orientation-dependent lifetime of single dye molecules at a dielectric interface.
M. Kreiter, M. Prummer, **B. Hecht** and U.P. Wild
J. Chem. Phys., **117** (2002) 9430-9433.
44. Fabricating arrays of single proteins on glass using microcontact printing.
J.P. Renault, A. Bernard, A. Bietsch, B. Michel, H.R. Bosshard, E. Delamarche, M. Kreiter, **B. Hecht**,
and U.P. Wild
J. Phys. Chem. B **107** (2003) 703-711.
45. Single-molecule near-field optical energy transfer microscopy with dielectric tips.
W. Trapesinger, A. Kramer, M. Kreiter, **B. Hecht**, U.P. Wild
J. of Microscopy **209** (2003) 249-253.
46. Three-dimensional Optical Polarization Tomography of Single Molecules.
M. Prummer, **B. Hecht**, and U.P. Wild
J. Chem. Phys., **118** (2003) 9824-9829.
47. Synthesis and conformational switching of novel asymmetrically-bridged resorcin[4]arenes.
V.A. Azov, F. Diederich, Y. Lill and **B. Hecht**
Helv. Chim. Acta **86** (6) (2003) 2149-2155.
48. Single dye molecules in an oxygen-depleted environment as photostable organic triggered
single-photon source.
Y. Lill and **B. Hecht**
Appl. Phys. Lett. **84** (2004) 1665-1667.
49. Nano-Optics with single quantum system.
B. Hecht
Review article (invited) for the Nano-Optics theme issue of
Phil. Trans. R. Soc. Lond. A **362** (2004) 881-899.
50. Excitation and superfocusing of surface plasmon polaritons on a silver-coated optical fiber tip
N.A. Janunts, K.S. Baghdasaryan, Kh.V. Nerkararyan and **B. Hecht**
Optics Commun. **253**, 118-124 (2005).
51. Resonant optical antennas.
P. Mühlischlegel, H.-J. Eisler, **B. Hecht** and D.W. Pohl
Science **308** (2005) 1607-1609.
52. Single quantum dot coupled to a scanning optical antenna: A tunable super-emitter.
J. Farahani, H.-J. Eisler, D.W. Pohl, and **B. Hecht**
Phys. Rev. Lett. **95** (2005) 017402.
53. Kinetics of the initial steps of G-protein coupled receptor mediated cellular signaling revealed
by single molecule imaging
Y. Lill, K.L. Martinez, M.A. Lill, B.H. Meyer, M. Lill, H. Vogel, **B. Hecht**
Chem. Phys. Chem. **6**, 1633-1640 (2005).
54. Optische Antennen.
B. Hecht, H.-J. Eisler, O.J.F. Martin, D.W. Pohl
Physik in unserer Zeit **5**, 209 (2005).
55. Glue-free tuning fork shear-force microscope
P. Mühlischlegel, J. Toquant, D.W. Pohl and **B. Hecht**
Rev. Sci. Instrum. **77**, 016105 (2006).

56. Resorcin[4]arene Cavitand-Based Molecular Switches: Switching Mechanisms, Monolayer Investigations, Molecular Recognition, and Large Multinanometer-Sized Expansion/Contraction Motions,
V.A. Azov, A. Beeby, M. Cacciarini, A. G. Cheetham, F. Diederich, M. Frei, J. K. Gimzewski, V. Gramlich, **B. Hecht**, B. Jaun, T. Latychevskaia, A. Lieb, Y. Lill, F. Marotti, A. Schlegel, R. R. Schlittler, P. J. Skinner, P. Seiler, Y. Yamakoshi
Adv. Funct. Mater. **16**, 147–156 (2006).
57. Uniaxial orientation of terylene in polyethylene
J. Butter, B.R. Crenshaw, C. Weder, and **B. Hecht**
Chem. Phys. Chem. **7**, 261-265 (2006).
58. Aperture scanning near-field optical microscopy and spectroscopy of single terylene molecules at 1.8K
J. Butter and **B. Hecht**
Nanotechnology **17**, 1547-1550 (2006).
59. Stark-shift microscopy.
S. Karotke, A. Lieb and **B. Hecht**
Appl. Phys. Lett. **89**, 023106 (2006).
60. Absorption and fluorescence of single molecules.
J. Butter, B.R. Crenshaw, C. Weder, and **B. Hecht**
J. Chem. Phys. **125**, 154710 (2006)
61. Bowtie antenna probes for single-emitter scanning near-field optical microscopy.
J. Farahani, H.-J. Eisler, D.W. Pohl, and **B. Hecht**
Nanotechnology. in revision.
62. Single-molecule diagnostics: Fiber-optical single-molecule fluorescence sensor detects single RNA copies in blood.
P. Haas, A. Wild, M. Hegner, M. Calame, U. Aebi, and **B. Hecht**
in preparation.
63. Single Hepatitis-B virus core capsid binding to individual nuclear pore complexes in HeLa cells.
Y. Lill, M. Lill, B. Fahrenkrog, K. Schwarz-Herion, S. Paulillo U. Aebi, and **B. Hecht**
Biophys. J. **91**, 3123-3130 (2006).
64. Detecting transient events in the presence of strong background.
P. Haas, A. Wild, A. Lieb, M. Hegner, M. Calame, and **B. Hecht**
Phys. Rev. E. in revision.
65. Everything you always wanted to know about nano-optics but were afraid to ask.
B. Hecht
Tutorial review (invited), *Nanotechnology*, in preparation.
66. Fast determination of saturation intensity and maximum emission rate by single-emitter imaging.
J.Y.P. Butter and **B. Hecht**
Optics Express **14**, 9350-9357 (2006).
67. Prospects of Resonant Optical Antennas for Nano-Analysis
B. Hecht, P. Mühlischlegel, J.N. Farahani, H.-J. Eisler, D.W. Pohl, O.J.F. Martin, P. Biagioni
Chimia **60**, 765-769 (2006).

Scientific output parameter $h = 21$ according to Hirsch³⁴ (based on ISI).

Scale:

$h = 12$ advancement to tenure (associate professor), $h = 18$ advancement to full professor

$h > 35$ candidate for Nobel prize :-)

THESES

1. Forbidden Light Scanning Near-Field Optical Microscopy.
B. Hecht
Dissertation, University of Basel (1996), Hartung-Gorre Verlag, Konstanz, ISBN 3-89649-072-9. <http://www.nano-optics.ch/docs/diss.pdf>
2. Nanoscopic Interactions probed by Single Molecules.
B. Hecht
Habilitation, Swiss Federal Institute of Technology (2002), <http://e-collection.ethbib.ethz.ch/show?type=habil&nr=3>

BOOKS

- Principles of Nano Optics (~500 pages) - Text book – L. Novotny and **B. Hecht**, Cambridge University Press, (2006)

BOOK CHAPTERS

- Optical Detection of Single Molecules at Interfaces
B. Hecht
book chapter (invited) in "Properties of Single Organic Molecules on Crystal Surfaces", F. Rosei, W. Hofer and P. Grütter, eds., World Scientific, (2006). ISBN 1-86094-628-3
- Resonant optical antennas and single emitters.
B. Hecht
book chapter (invited),
Series: "Advances in Nano-Optics and Nano-Photonics", S. Kawata, ed., Elsevier, in press.

PATENTS

1. Near-field optical microscope.
B. Hecht and H. Heinzelmann and L. Novotny and D. W. Pohl
Europ. Patent Application, Internat. Publication Nr. WO 95/10060 (1993)
United States Patent **#5,739,527** April 14, 1998.
2. Sensor for remote optical single-molecule detection using near-field coupling
P. Haas, **B. Hecht**, A. Wild, M. Calame, M. Hegner, patent pending.

³ <http://www.pnas.org/cgi/content/abstract/102/46/16569>

⁴ http://arxiv.org/PS_cache/physics/pdf/0508/0508025.pdf

INVITED LECTURES:

- ❑ Workshop "Surface and Interface Optics", Sainte-Maxime, 4-9 May, 1999.
- ❑ Colloquium at the Institute for Physical Chemistry, LMU München, Prof. Bräuchle, 2000.
- ❑ Colloquium at the 5. Physical Institute of the University of Stuttgart, Prof. J. Wrachtrup, 2000.
- ❑ Gordon Research Conference, Lasers in Medicine, Connecticut College, New London, USA, 2000.
- ❑ Plenary lecture at the joint symposium of Polymer Physics and Chemical Physics at the German Physical Society Spring Meeting, Potsdam, 2000.
- ❑ Colloquium at the Chemistry Institute, University of Zürich, 26.04.2001.
- ❑ Colloquium at the Institute for Physics, University of Basel, 18.06.2001.
- ❑ 10th International Conference on Unconventional Photoactive Systems UPS, Les Diablerets, Switzerland, 04-08.09.2001
- ❑ Joint meeting of the European societies of physical chemistry, Venedig (Italien), October 3-6, 2001.
- ❑ Colloquium at the Laboratoire de Nanotechnologie et d'Instrumentation Optique, Université de Technologie de Troyes, France, 28.02.2002
- ❑ Spring school on Single Molecules in Physics, Chemistry and Biology Hofgeismar, Germany, April 8-12, 2002.
- ❑ EL.B.A. / Max Planck - Forum on Nanoscale Science & Technology, MPI Polymerforschung, Mainz, 25.09. - 28.09. 2002
- ❑ SMARTON Concluding symposium, Leuven, Belgium, 20.10. – 23.10.2002
- ❑ Solar'03, 23-28 February 2003 Luxor, Egypte (not attended)
- ❑ Spring meeting of the Swiss Physical Society, Basel, Switzerland, 20/21.03.2003
- ❑ Swiss/US Nano-forum, Basel, Switzerland, 13./14.10.2003
- ❑ American Chemical Society National Meeting, Symposium on "Microscopy and Dynamics Beyond the Diffraction Limit" Anaheim, California, March 28-April 1, 2004.
- ❑ Japanese/Swiss Nano-forum, Nara, Japan, June 23 - 25, 2004.
- ❑ Annual meeting of the Swiss Society for Optics and Microscopy, 12. November 2004, Biozentrum, Universität Basel
- ❑ MRS Fall meeting 2004, Boston, USA, Nov. 29- Dec. 3, 2004

- Fourth Asian Photochemistry Conference, January 05. – 10., 2005, Taipei, Taiwan
- 2004 EMCCD Symposium – Discover new ways of seeing, Waters Edge, Connecticut, USA, 14-16. April 2005.
- Seventh Giambiagi Winter School: “New Trends in Complex Materials”, Physics Department of the School of Sciences of the University of Buenos Aires, July 25th to July 29th, 2005, Buenos Aires, Argentina
- Symposium “New trends in Nano-optics”, TU Chemnitz, 08.04.2005, Chemnitz, Germany.
- Kolloquium, EMPA-Akademie, 21.04.2005, St. Gallen, Switzerland.
- Seminar, Center of Applied Photonics, Universität Konstanz, 08.06.2005
- Kolloquium Max-Planck-Institut für Festkörperforschung, Prof. K. Kern, Stuttgart, 06.07.2005, Stuttgart, Germany.
- DPG Physics School: „The Physics of Imaging“, Bad Honnef, 25.09-30.09.2005, Germany
- Workshop of the European project “Advanced Scanning Probes for Innovative Nanoscience and Technology” (ASPRINT), Dijon, 24-25.10 2005, France.
- ‘Near field optical, infrared and Raman imaging:’ from molecules to nanoparticles, March 23-24, 2006, Jyväskylä, Finland
- EOS Topical meeting: “Molecular plasmonic devices”, April 27-29, 2006, Engelberg, Switzerland
- Institute Seminar, Institute for Analytical Sciences / ISAS, Dortmund, Germany, June 11, 2006
- 16th International Microscopy Congress (IMC16), Sept. 3 to 8, 2006, Sapporo, Japan
- 9th International Conference on Near-field optics, Nanophotonics and related techniques, 10-15 September 2006, Lausanne Switzerland
- Research Conference on Photonic Nano-Objects, 22-26 January 2007, Les Houches, France
- European MRS Spring conference 2007, "Sub-wavelength energy localization throughout the spectrum: Materials and Techniques", May 28th - June 1st, 2007, Strasbourg, France
- Sommerakademie der Studienstiftung des deutschen Volkes, 09. - 22. September 2007, Guidel-Plage, France
- 7th Pacific Rim Conference on Lasers and Electro-Optics (CLEO®/Pacific Rim 2007, Seoul, Korea, August 26 - 31, 2007.