

# RESUME

(2/10)

*Lukas Novotny*

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## APPOINTMENTS

**Distinguished Visiting Professor** since 1/10.

ICFO - Institut de Ciencies Fotoniques, Barcelona, Spain.

**Visiting Professor** 8/08-8/09.

ICFO - Institut de Ciencies Fotoniques, Barcelona, Spain.

**Professor of Optics and Physics** since 3/07.

The Institute of Optics and Department of Physics, University of Rochester, Rochester, NY, U.S.A.

**Professor of Biomedical Engineering** since 3/07.

Department of Biomedical Engineering, University of Rochester, Rochester, NY, U.S.A.

**Biophysics and Structural Biology Cluster Member** since 2/06.

University of Rochester Medical Center, Rochester, NY, U.S.A.

**Associate Professor of Optics** 9/03-2/07.

The Institute of Optics, University of Rochester, Rochester, NY, U.S.A.

**Research Scientist** since 7/00.

Laboratory for Laser Energetics, Rochester, NY, U.S.A.

**Assistant Professor of Optics** 7/99 - 8/03.

The Institute of Optics, University of Rochester, Rochester, NY, U.S.A.

**Research Fellow** 4/96 - 6/99.

Pacific Northwest National Laboratory, Richland, WA, U.S.A.

Physics of Nanometer Scale Phenomena.

## EDUCATION

**Dr. sc. techn.** (Doctor of Technical Sciences), degree 1996.

Swiss Federal Institute of Technology. Zürich, Switzerland. In collaboration with IBM Research Division, Rüschlikon, Switzerland.

PhD thesis: Light Propagation and Light Confinement in Near-field Optics.

**Dipl. El-Ing. ETH** (Certified Electrical Engineer), degree 1992.

Swiss Federal Institute of Technology. Zürich, Switzerland.

Diploma thesis: Detection of High Frequency Signals in Scanning Tunneling Microscopy.

**Matura Typus C** (Maturity Type C = Natural Sciences), degree 1986.

Mathematisch Naturwissenschaftliches Gymnasium. Zürich, Switzerland.

Major: Natural Sciences, Mathematics.

## AWARDS AND HONORS

### **M. T. Thomas Award 1997**

awarded annually by the Pacific Northwest National Laboratory for outstanding postdoctoral achievement.

### **ETH Medal 1997**

awarded annually by the Swiss Federal Institute of Technology for outstanding dissertation.

### **AWU Fellowship 1996-1999**

Fellowship grant awarded by Associated Western Universities.

### **2007 OSA Fellow**

for pioneering contributions to the field of nanoscale spectroscopy and for leadership in the community of near-field optics.

### **2010 AAAS Fellow**

for distinguished contribution to nano optics and electromagnetic theory.

## PATENTS AND INVENTIONS

- [1] L. Novotny and B. Deutsch, "Common-path interferometer rendering amplitude and phase of scattered light, *U.S. Patent Application*, No. 12/210,693 (2008).
- [2] L. Novotny and F. Ignatovitch, "Multi-color heterodyne interferometric apparatus and method for sizing nanoscale particles," *U.S. Patent Application*, No. 11/710,976 (2007).
- [3] L. Novotny and F. Ignatovitch, "Apparatus and method for sizing nanoparticles based on interferometric field detection," *U.S. Patent*, No. 7,528,959 B2 (2009).
- [4] L. Novotny and T. Brown, "System and method for high resolution optical imaging, data storage, lithography, and inspection," *U.S. Patent*, No. 7,526,158 (2009).
- [5] L. Novotny, X. S. Xie, R. X. Bian, and E. J. Sanchez, "Near-field optical imaging and optical tweezers using metallic tips," *U.S. Department of Energy, Invention E-1530 under Contract DE-AC06-76RLO 1830*, September (1996).
- [6] B. Hecht, H. Heinzelmann, L. Novotny, and D. W. Pohl, "Near-field Optical Microscope," *IBM Corp., International Patent WO 95/10060*, October (1993).

## BOOKS

- [1] L. Novotny and B. Hecht, *Principles of Nano-Optics*, Cambridge University Press (2006).

## PEER REVIEWED JOURNAL PUBLICATIONS (h=36)

- [1] J. Renger, R. Quidant, N. Van Hulst, and L. Novotny, "Surface enhanced nonlinear four-wave mixing," *Phys. Rev. Lett.*, in print (2010).
- [2] L. Novotny, "Strong coupling, energy splitting, and level crossings: A classical perspective," *Am. J. Phys.*, submitted (2010).
- [3] B. Deutsch, R. Hillenbrand, and L. Novotny, "Visualizing the optical interaction tensor of a gold nanoparticle pair," *Nano Lett.*, in print (2010).
- [4] P. Bharadwaj and L. Novotny, "Plasmon enhanced photoemission from a single Y<sub>3</sub>N@C<sub>80</sub> fullerene," *J. Phys. Chem. C*, accepted (2010).

- [5] A. Mitra, B. Deutsch, F. Ignatovich, and L. Novotny, "Nano-optofluidic detection of single viruses," *ACS Nano*, accepted (2010).
- [6] A. Mitra, H. Harutyunyan, S. Palomba, and L. Novotny, "Tuning the cavity modes of a Fabry-Perot resonator using gold nanoparticles," *Opt. Lett.*, submitted (2010).
- [7] Z. Shi, G. Piredda, A. C. Liapis, M. A. Nelson, L. Novotny, and R. W. Boyd, "Surface plasmon polaritons on metal-dielectric nanocomposite films," *Opt. Lett.* **34**, 3535 - 3537 (2009).
- [8] S. Palomba and L. Novotny, "Near-field imaging with a localized nonlinear light source," *Nano Lett.* **9**, 3801-3804 (2009).
- [9] J. Renger, R. Quidant, N. Van Hulst, S. Palomba, and L. Novotny, "Free-space excitation of propagating surface plasmon polaritons by nonlinear four-wave mixing," *Phys. Rev. Lett.* **103**, 266802 (2009).
- [10] L. G. Cancado, A. Jorio, A. Hartschuh, A. Ismach, E. Joselevich, and L. Novotny, "Near-field Raman enhancement in one-dimensional systems," *Phys. Rev. Lett.* **103**, 186101 (2009).
- [11] C. Georgi, M. Boehmle, H. Qian, L. Novotny, and A. Hartschuh, "Probing exciton propagation and quenching in carbon nanotubes with near-field optical microscopy," *Phys. Stat. Sol. (b)* **246**, 2683-2688 (2009).
- [12] P. Bharadwaj, B. Deutsch, and L. Novotny, "Optical antennas," *Adv. Opt. Photon.* **1**, 438-483 (2009).
- [13] L. G. Cancado, A. Hartschuh, and L. Novotny, "Tip enhanced Raman scattering of carbon nanotubes," *J. Raman Spec.* **40**, 1420-1426 (2009).
- [14] S. Palomba, M. Danckwerts, and L. Novotny, "Nonlinear plasmonics with gold nanoparticle antennas," *J. Opt. A: Pure Appl. Opt.* **11**, 114030 (2009).
- [15] H. Qian, N. Anderson, C. Georgi, L. Novotny, and A. Hartschuh, "Tip-enhanced optical microscopy", in *Nano-Optics and Near-Field Optical Microscopy*, A. Zayats & D. Richards (eds.), Artech House, Boston/London (2009).
- [16] A. Hartschuh, H. Qian, C. Georgi, and L. Novotny, "Tip-enhanced near-field optical microscopy of carbon nanotubes," *Anal. and Bioanal. Chem.*, **394**, 1787-1795 (2009).
- [17] L. Ding, G. Cancado, L. Novotny, N. Anderson, R. I. Blackwell, J. F. Künzler, and W. Knox, "Micro-Raman spectroscopy of refractive index microstructures in silicone-based hydrogel polymers created by high-repetition-rate femtosecond laser micromachining," *J. Opt. Soc. Am. B* **26**, 595-602 (2009).
- [18] C. Hoepfner, R. Beams, and L. Novotny, "Background suppression in near-field optical imaging," *Nano Lett.* **9**, 903908 (2009).
- [19] L. Novotny, "Optical antennas tuned to pitch," *Nature* **455**, 879 (2008).
- [20] I. O. Maciel, N. Anderson, M. A. Pimenta, A. Hartschuh, H. Qian, M. Terrones, H. Terrones, J. Campos-Delgado, A. M. Rao, L. Novotny, and A. Jorio, "Electron and phonon renormalization at defect/doping sites in carbon nanotubes," *Nature Materials* **7**, 878 - 883 (2008).
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- [22] S. Palomba and L. Novotny, "Nonlinear excitation of surface plasmon polaritons by four-wave mixing," *Phys. Rev. Lett.* **101**, 056802 (2008).

- [23] H. Qian, C. Georgi, N. Anderson, A. A. Green, M. C. Hersam, L. Novotny, and A. Hartschuh, "Exciton transfer and propagation in carbon nanotubes studied by near-field optical microscopy," *Phys. Stat. Sol. (b)* **245**, 2243-2246 (2008).
- [24] C. Hoeppener and L. Novotny, "Imaging of membrane proteins using antenna-based optical microscopy," *Nanotechnology* **19**, 384012 (2008).
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- [26] S. Palomba, L. Novotny, and R. E. Palmer, "Blue-shifted plasmon resonance of individual size-selected gold nanoparticles," *Opt. Commun.* **281**, 480-483 (2008).
- [27] H. Qian, C. Georgi, N. Anderson, A. A. Green, M. C. Hersam, L. Novotny, and A. Hartschuh, "Exciton energy transfer in pairs of single-walled carbon nanotubes," *Nano Lett.* **8**, 1363-1367 (2008).
- [28] L. Novotny and C. Henkel, "Van der Waals versus optical interaction between metal nanoparticles," *Opt. Lett.* **33**, 1029-1031 (2008).
- [29] C. Hoeppener and L. Novotny, "Antenna-based optical imaging of single Ca<sup>2+</sup> transmembrane proteins in liquids," *Nano Lett.* **8**, 642-646 (2008).
- [30] B. Deutsch, R. Hillenbrand, and L. Novotny, "Near-field amplitude and phase recovery using phase-shifting interferometry," *Opt. Express* **16**, 494-497 (2008).
- [31] R. J. Moerland, T. H. Taminiau, L. Novotny, N. F. van Hulst, and L. Kuipers, "Reversible polarization control of single molecule emission," *Nano Lett.* **8**, 606-610 (2008).
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- [34] L. Novotny and A. Bouhelier, "Near-field optical excitation and detection of surface plasmons," in *Surface Plasmon Nanophotonics*, M. Brongersma (ed.), Kluwer Academic Press (2007).
- [35] P. Bharadwaj and L. Novotny, "Spectral dependence of single molecule fluorescence enhancement," *Opt. Express* **15**, 14266-14274 (2007).
- [36] L. Novotny, "Effective wavelength scaling for optical antennas," *Phys. Rev. Lett.* **98**, 266802 (2007).
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- [45] A. Hartschuh, H. Qian, A. J. Meixner, N. Anderson, and L. Novotny "Tip-enhanced optical spectroscopy for surface analysis in biosciences," *Surface and Interface Analysis* **38**, 1472-1480 (2006).
- [46] M. R. Beversluis, L. Novotny, and S. J. Stranick, "Programmable vector point-spread function engineering," *Opt. Express* **14**, 2650 (2006).
- [47] J. F. Lesoine, B. Holmberg, P. Maloney, X. Wang, L. Novotny, and P. A. Knauf, "Development of an spFRET method to measure structure changes in ion exchange proteins," *Acta Physiol.* **187**, 141-147 (2006).
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- [118] H. Heinzelmann, B. Hecht, L. Novotny, and D. W. Pohl, “Forbidden light scanning near-field optical microscopy,” *J. Microsc.* **177**, 115–118 (1994).
- [119] D. W. Pohl and L. Novotny, “Near-field optics: Light for the world of NANO,” *J. Vac. Sci. and Technol. B* **12**, 1441–1446 (1994).
- [120] B. Michel, L. Novotny, and U. Dürig, “Low-temperature compatible I-V converter,” *Ultra-microscopy* **42-44**, 1647–1652 (1992).

## COMMITTEES AND PROFESSIONAL ACTIVITIES

- [1] General Chair, OSA Annual Meeting, Frontiers in Optics  
*Rochester, NY, USA*, October (2010).
- [2] Program committee, SPIE Optics & Photonics 2010, Plasmonics VI,  
*San Diego, CA, USA*, August (2010).
- [3] International advisory committee, 11th International Conference on Near-field Optics,  
*Beijing, China*, August / September (2010).
- [4] Program committee, SPIE Optics & Photonics 2009, Metal Nanoplasmonics,  
*San Diego, CA, USA*, August (2009).
- [5] Program committee, NanoMeta 2009,  
*Seefeld, Austria*, January (2009).
- [6] Scientific advisory committee, 4th Int’l Conf. on Surface Plasmon Photonics (SPP4),  
*Amsterdam, The Netherlands*, June (2009).
- [7] Chair, OSA Annual Meeting, Frontiers in Optics  
*Rochester, NY, USA*, October (2008).
- [8] Program committee, SPIE Optics & Photonics 2008, Metal Nanoplasmonics,  
*San Diego, CA, USA*, August (2008).
- [9] Scientific Advisory Board (since ’07), “*Nano-Light*”, Spanish Ministry of Science and Education.
- [10] Technical Advisory Board (since 2006), RHK Technology, Troy, MI.
- [11] Proposal Evaluation Board ’07-’08, Center for Nanoscale Materials (CNM),  
Argonne National Laboratory.
- [12] Scientific Review Panel ’08, Condensed Matter Physics (CMP),  
Oak Ridge National Laboratory.
- [13] International advisory committee, 10th International Conference on Near-field Optics,  
*Buenos Aires, Argentina*, September, 1-5 (2008).
- [14] Technical committee, IEEE/LEOS Nanophotonics 2007.
- [15] Program committee, SPIE Optics & Photonics 2007, Metal Nanoplasmonics,  
*San Diego, CA, USA*, August (2007).
- [16] International advisory committee, 9th International Conference on Near-field Optics,  
*Lausanne, Switzerland*, September (2006).
- [17] Executive Committee of the Science & Engineering Council (ECSEC),  
Optical Society of America (OSA).

- [18] Charles Hard Townes Award Committee (since '07), Optical Society of America (OSA).
- [19] Program committee, SPIE Optics & Photonics 2006, Complex Light and Optical Forces, *San Diego, CA, USA*, August (2006).
- [20] Program committee, SPIE Optics & Photonics 2006, Metal Nanoplasmonics, *San Diego, CA, USA*, August (2006).
- [21] Program committee, Int'l Conference on Nanoscience and Technology ICN&T , *Basel, Switzerland*, July/August, 2006.
- [22] Technical committee, IEEE/LEOS Nanophotonics 2006.
- [23] Organizing Committee, Int'l Workshop on Nanophotonics and Nanobiotechnology, *Istanbul, Turkey*, Koc University, June 2005.
- [24] Chair, Nano-Optics Subcommittee *CLEO/QELS* , *Baltimore, ML, USA*, May (2005).
- [25] Program committee, 5th International Conference on Photonics, Devices, and Systems, *Prague, Czech Republic*, June (2005).
- [26] Program committee, SPIE Optics & Photonics 2005, Plasmonics, *San Diego, CA, USA*, August (2005).
- [27] Committee member, OSA Topical Meeting on Nanophotonics for Information Systems, *San Diego, CA, USA*, April (2005).
- [28] Technical committee, IEEE/LEOS Nanophotonics 2005.
- [29] Program committee, SPIE / Photonics West, Nano-Manipulation with Light, *San Jose, CA, USA*, January (2005).
- [30] International advisory committee, 8th International Conference on Near-field Optics, *Seoul, Korea*, September (2004).
- [31] Review Board, NIH Panel on Nanotechnology, *Washington, DC*, December (2004).
- [32] Symposium Organizer, *Microscopy and Dynamics Beyond the Diffraction Limit* American Chemical Society National Meeting, *Anaheim, CA*, 28 March - 1 April (2004).
- [33] Program committee member *CLEO/IQEC* , *San Francisco, CA, USA*, May (2004).
- [34] Int'l Program Committee, XI Int'l Conference on Laser-Matter Interaction (LMI-11), *St. Petersburg, Russia*, 30 June - 2 July (2003).
- [35] Conference Chair and Organizer, 7th International Conference on Near-field Optics, *Rochester, NY, USA*, 17-21 August (2002).
- [36] Symposium co-Organizer, Progress in Electromagnetics Research Symposium, *Cambridge, MA, USA*, 1-5 July (2002).
- [37] Program committee member *CLEO/QELS* , *Long Beach, CA, USA*, May (2002).
- [38] Program committee member *CLEO/QELS* , *Baltimore, ML, USA*, 6-11 May (2001).
- [39] International Advisory Committee, 6th International Conference on Near-field Optics, *Twente, The Netherlands*, 27-31 August (2000).

- [40] Symposium co-Organizer, Materials Research Society,  
*San Francisco CA, USA*, April 1999.

## TEACHING

Fall 99 : Quantum Mechanics of Optical Materials and Devices (OPT223)  
 Fall 00 : Nano-Optics (OPT592)  
 Spring 01: Physical Optics II (OPT462)  
 Fall 01 : Nano-Optics (OPT592)  
 Spring 02: Quantum Mechanics of Optical Materials and Devices (OPT223)  
 Fall 02 : Quantum Mechanics of Optical Materials and Devices (OPT223)  
 Spring 03: Optics Laboratories (OPT256)  
 Fall 03 : Nano-Optics (OPT592)  
 Spring 04: Quantum Mechanics of Optical Materials and Devices (OPT223)  
 Fall 04 : Nano-Optics (OPT592)  
 Spring 05: Quantum Mechanics of Optical Materials and Devices (OPT223)  
 Fall 05 : Nano-Optics (OPT463)  
 Spring 06: Quantum Mechanics of Optical Materials and Devices (OPT223)  
 Fall 06 : Nano-Optics (OPT463)  
 Spring 07: Quantum Mechanics of Optical Materials and Devices (OPT223)  
 Fall 07 : Nano-Optics (OPT463)  
 Spring 08: Quantum Mechanics of Optical Materials and Devices (OPT223)  
 Fall 09 : Nano-Optics (OPT463)  
 Spring 10: Quantum Optics (OPT412)

## CONFERENCE PRESENTATIONS (since 2003)

- [1] 11th Int'l Conference on Near-field Optics and Related Techniques (invited) ,  
*Beijing, China*, August 2010.
- [2] SPIE Conference on Nanoplasmonics (invited),  
*San Diego, CA*, August 2010.
- [3] 2010 Int'l Symposium on Advancing the Chemical Sciences (ISACS) (invited) ,  
*Budapest, Hungary*, July 2010.
- [4] European Optical Society Meeting (invited) ,  
*Engelberg, Switzerland*, June 2010.
- [5] Nanoscience Summer School (invited) ,  
Institut d'Optique, *Paris, France*, June 2010.
- [6] Gordon Conference on Plasmonics (invited) ,  
*Waterville, ME*, Colby College, June 2010.
- [7] Metallic Metamaterials and Plasmonics (invited)  
Royal Society Discussion Meeting, *Chicheley Hall, London, GB*, June 2010.
- [8] Nano-Optics, Plasmonics, and Advanced Materials Workshop (overview lecture)  
National Institute of Science and Technology (NIST), *Gaithersburg, MA*, April 2010.
- [9] Physics of Quantum Electronics Conference (PQE2010) (invited)  
*Snowbird, UT*, January 2010.

- [10] DARPA Optical Nanoantennas Workshop (invited),  
*Defence Science Research Council*  
*Arlington, VA*, October 2009.
- [11] Nanostructures at Surfaces- Spectroscopy at the Atomic and Molecular Scale (invited) ,  
*Monte Verita, Switzerland*, September 2009.
- [12] Frontiers of Engineering, National Academy of Engineering (invited) ,  
*Irvine, CA*, September 2009.
- [13] AFOSR Joint Electronics Workshop (invited) ,  
*Arlington, VA*, May 2009.
- [14] American Physical Society (APS) Meeting (invited) ,  
*Pittsburgh, PA*, March 2009.
- [15] IONS-5, International OSA Network of Students (plenary) ,  
*Barcelona, Spain*, February 2009.
- [16] Workshop on Nanoantennas (invited) ,  
*Paris, France*, January 2009.
- [17] Nanometa 2009 (invited) ,  
*Seefeld, Austria*, January 2009.
- [18] Future of Light Symposium, Boston University Photonics Center (invited plenary) ,  
*Boston, MA*, December 2008.
- [19] 2008 NSF Nanoscale Science and Engineering Conference (invited plenary) ,  
*Arlington, VA*, December 2008.
- [20] OSA Topical Meeting on Plasmonics and Metamaterials (invited) ,  
*Rochester, NY*, October 2008.
- [21] Symposium on Advanced Microscopy Techniques for Immunoscopes (invited) ,  
*Barcelona, Spain*, October 2008.
- [22] Atomic Scale Functional Imaging Workshop (invited) ,  
*Annapolis, MD*, September 2008.
- [23] 10th Int'l Conference on Near-field Optics and Related Techniques (invited) ,  
*Buenos Aires, Argentina*, September 2008.
- [24] Workshop on Numerical Methods for Optical Nanostructures (invited)  
*ETH Zurich, Switzerland*, July 2008.
- [25] Crossborder Workshop (invited)  
*Cornell, NY*, June 2008.
- [26] Frontiers in Nanoscience (invited)  
*Schloss Ringberg, Germany*, April 2008.
- [27] Industrial Associates Meeting, The Institute of Optics, University of Rochester  
*Rochester, NY*, March 2008.
- [28] SPIE Photonics West Conference (invited)  
*San Jose, CA*, January 2008.
- [29] Physics of Quantum Electronics Conference (PQE2008) (invited)  
*Snowbird, UT*, January 2008.

- [30] Materials Research Society Meeting (invited)  
*Boston, MA*, November 2007.
- [31] 96th Int'l Titisee Conference "Trends in Biological Optical Microscopy" (invited)  
*Titisee, Germany*, November 2007.
- [32] Canadian Institute for Advanced Research Nanoelectronics Meeting (invited),  
*Vancouver, Canada*, November 2007.
- [33] APS Laser Science XXIII & OSA Annual Meeting (invited),  
Symposium on *Nanoscale Localization of Light*,  
*San Jose, CA*, September 2007.
- [34] SPIE Conference on Nanoplasmonics (invited),  
*San Diego, CA*, August 2007.
- [35] 8th Int'l Conference on Carbon Nanotubes, NT07,  
*Belo Horizonte, Brazil*, June 2007.
- [36] 3rd Int'l Conference on Surface Plasmons Polaritons (invited),  
*Dijon, France*, June 2007.
- [37] Gordon Conference on Mechanisms of Membrane Transport (invited),  
*Tilton, NH*, June 2007.
- [38] Imaging Cell Signaling Symposium (invited),  
*Rochester, NY*, January 2007.
- [39] APS Laser Science XXII & OSA Annual Meeting (invited),  
Symposium on *Carbon Nanotube Spectroscopy*,  
*Rochester, NY*, October 2006.
- [40] 9th Int'l Conference on Near-field Optics and Related Techniques (invited) ,  
*Lausanne, Switzerland*, September 2006.
- [41] SPIE Optics & Photonics 2006, Metal Nanoplasmonics (invited)  
*San Diego, CA, USA*, August 2006.
- [42] Int'l Conference on Nanoscience and Technology ICN&T (invited) ,  
*Basel, Switzerland*, July/August 2006.
- [43] Workshop on Numerical Methods for Optical Nano Structures (invited) ,  
*Zurich, Switzerland*, July 2006.
- [44] Workshop on Advanced Scanning Probes for Innovative Nanoscience (invited) ,  
*Barcelona, Spain*, May 2006.
- [45] Department of Energy Separations & Analysis Contractors' Meeting (invited) ,  
*Airlie, VA*, April 2006.
- [46] Int'l Winterschool on Electronic Properties of Novel Materials (invited) ,  
*Kirchberg, Austria*, March 2006.
- [47] Int'l Symposium on Scientific Imaging: Seeing the Invisible (invited) ,  
*Madrid, Spain*, Fundacion Ramon Areces, November 2005.
- [48] OSA Annual Meeting *Frontiers in Optics* (invited),  
*Tucson, AZ*, October 2005.
- [49] Gordon Conference on Quantum Control of Light and Matter (invited) ,  
*Waterville, ME*, Colby College, August 2005.

- [50] Int'l Workshop on Nanotube Optics and Nanospectroscopy (invited) ,  
*Telluride, CO*, July 2005.
- [51] Int'l Workshop on Nanophotonics and Nanobiotechnology (invited) ,  
*Istanbul, Turkey*, Koc University, June 2005.
- [52] 5th Int'l Conference on Photonics, Devices, and Systems (invited) ,  
*Prague, Czech Republic*, June 2005.
- [53] SPIE Conference on Smart Structures and Materials (invited) ,  
*San Diego, CA*, March 2005.
- [54] Workshop on Nanoscale Subsurface Spectroscopy and Tomography (invited) ,  
*Lenox, MA*, Cranwell Resort, February 2005.
- [55] Winter College on Optics and Photonics in Nanoscience and Nanotechnology (invited) ,  
*Trieste, Italy*, Abdus Salam Int. Centre for Theoretical Physics, February 2005.
- [56] Int'l Workshop on Nanoscale Spectroscopy and Nanotechnology (invited) ,  
*College Park, MD*, University of Maryland, December 2004.
- [57] Fall Meeting of the Material Research Society (invited),  
Panel discussion on *Future SPM Challenges and Opportunities*,  
*Boston, MA*, November/December 2004.
- [58] Fall Meeting of the Material Research Society (invited),  
Symposium on *Scanning-Probe and Other Novel Microscopies*,  
*Boston, MA*, November/December 2004.
- [59] AFOSR Meeting on *Multidimensional Sensing and Spectroscopy* (invited),  
*Dayton, OH*, November 2004.
- [60] OSA Annual Meeting *Frontiers in Optics* (invited),  
*Rochester, NY*, October 2004.
- [61] Gordon Research Conference on Laser Interactions with Materials (invited),  
*Andover, NH*, August 2004.
- [62] Great Lakes Photonics Symposium (invited),  
*Cleveland, OH*, June 2004.
- [63] Symposium on "20 years of Nano-Optics" (invited),  
*Basel, Switzerland*, University of Basel, April 2004.
- [64] American Chemical Society Meeting (invited),  
Symposium on *Microscopy Beyond the Diffraction Limit*,  
*Anaheim, CA*, March 2004.
- [65] National Nanotechnology Initiative Interagency Workshop (plenary speaker)  
"Instrumentation and Metrology for Nanotechnology" (Grand Challenge Workshop),  
National Institute of Standards and Technology, Gaithersburg, January 2004.
- [66] XXI Brazilian Physical Society Meeting (invited),  
*Fortaleza CE, Brazil*, November 2003.
- [67] DARPA 2003: University Opto Centers Conference (invited),  
*Coronado CA, USA*, September 2003.
- [68] Stanford Photonics Research Center Annual Meeting (invited),  
*Stanford CA, USA*, September 2003.

- [69] Atomic Molecular and Optical Sciences Meeting (invited),  
DOE, Basic Energy Sciences  
*Tahoe City CA, USA*, September 2003.
- [70] Microscopy and Microanalysis 2003 Meeting (invited),  
Symposium on *Focus on Raman and Infrared Microanalysis*,  
*San Antonio TX, USA*, August 2003.
- [71] International Conference on Laser-Matter Interaction, LMI-11 (invited),  
*St. Petersburg, Pushkin, Russia*, June/July 2003.
- [72] 2003 CLEO/QELS Conference (invited),  
Symposium on *Nano-Optics*,  
*Baltimore MA, USA*, June 2003.
- [73] 2003 Photonics North (invited),  
*Montreal, Canada*, May 2003.
- [74] Meeting of the Royal Microscopy Society (invited),  
*UK Scanning Probe Microscopy Meeting*  
*Swansea, UK*, April 2003.
- [75] DARPA Biophotonics Workshop (invited),  
*Defence Science Research Council*  
*Arlington, VA*, March 2003.
- [76] Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (invited),  
Symposium on *Bioanalytical Microsystems*  
*Orlando FL, USA*, March 2003.
- [77] Annual American Physical Society (APS) meeting (invited),  
Symposium on *Nanophotonics*  
*Austin TX, USA*, March 2003.
- [78] SPIE Photonics West Meeting (invited),  
Symposium on Multiphoton Microscopy in the Biomedical Sciences III,  
*San Jose CA, USA*, January 2003.

#### **COLLOQUIA AND SEMINARS** (since 2003)

- [1] University of Arizona, Tempe, AZ, April 4 (2010).
- [2] University of California Irvine (UCI), Irvine, CA, March 2 (2010).
- [3] Institut de Ciències Fotoniques (ICFO), Castelldefels (Barcelona), Spain, February 19 (2010).
- [4] University of Western Ontario, London, Ontario, February 10 (2010).
- [5] California Institute of Technology, Pasadena, TX, November 20 (2009).
- [6] Rice University, Keck Seminar, Houston, TX, November 13 (2009).
- [7] University of Ottawa, Ottawa, Canada, August 27 (2009).
- [8] Universidad de Zaragoza, Dept. de Física de la Mat. Cond., Zaragoza, Spain, May 22 (2009).
- [9] Instituto de Optica - CSIC, Madrid, Spain, April 24 (2009).
- [10] St. Andrews University, Department of Physics, UK, March 06 (2009).

- [11] University of Stuttgart, Department of Physics, Germany, February 17 (2009).
- [12] Cambridge University, Cambridge, Great Britain, December 12 (2008).
- [13] Institut de Ciencies Fotoniques (ICFO), Castelldefels (Barcelona), Spain, Sep. 9/10 (2008).
- [14] Washington University, Seattle, WA, May 22 (2008).
- [15] University of Utah at Salt Lake City, Salt Lake City, UT, April 3 (2008).
- [16] Argonne National Laboratory, Argonne, IL, March 19 (2008).
- [17] State University of New York at Buffalo, Buffalo, NY, March 27 (2008).
- [18] Phelps Colloquium, University of Rochester, Rochester, NY, March 6 (2008).
- [19] University of Texas at Austin, Austin, TX, February 21 (2008).
- [20] University of Konstanz, Department of Physics, Germany, November 19 (2007).
- [21] University of Illinois, Urbana-Champaign, IL, October 25 (2007).
- [22] Ohio State University, Columbus, OH, October 11 (2007).
- [23] Agilent, Santa Clara, CA, September 17 (2007).
- [24] Johns Hopkins University, Baltimore, MD, January 10 (2007).
- [25] University of Pennsylvania, Philadelphia, PA, January 8 (2007).
- [26] Rochester Institute of Technology, Rochester, NY, December 13 (2006).
- [27] McGill University, Department of Physics, Montreal, Canada, November 30 (2006).
- [28] Center for NanoScience, Ludwig Maximilian University, Munich, Germany, July 14 (2006).
- [29] National Research Council, Steacie Research Center, Ottawa, Canada, May 5 (2006).
- [30] Duke University, Fitzpatrick Institute for Photonics, Durham, NC, April 4 (2006).
- [31] University of Vienna, Department of Physics, Vienna, Austria, March 13 (2006).
- [32] Queens University, Department of Physics, Kingston, Canada, December 7 (2005).
- [33] University of Rochester, Department of Biomedical Engineering, September 20 (2005).
- [34] University of Tuebingen, Department of Physical Chemistry, Germany, June 16 (2005).
- [35] Swiss Federal Institute of Technology, ETH Zurich, Switzerland, June 1 (2005).
- [36] University of Basel, Department of Physics, Switzerland, May 25 (2005).
- [37] Cornell University, Department of Applied Physics, May 11 (2005).
- [38] IBM Research Laboratories, T.J. Watson Research Center, Yorktown NY, April 29 (2005).
- [39] Purdue University, Department of Computer and Electrical Engineering, April 8 (2005).
- [40] University of Rochester, Department of Physics and Astronomy, March 30 (2005).
- [41] Los Alamos National Laboratory, Center for Integrated Nanotechnologies, March 8 (2005).
- [42] University at Albany, College of Nanoscale Science and Engineering, February 25 (2005).
- [43] University of Connecticut, Materials Science & Engineering, January 19 (2005).



- [44] Indiana University, Department of Chemistry, November 11 (2004).
- [45] Lawrence Livermore National Laboratory, October 18 (2004).
- [46] SUNY Brockport, Department of Physics / Chemistry, October 7 (2004).
- [47] University of Twente, Enschede, The Netherlands, June 25 (2004).
- [48] Bristol-Myers Squibbs, New Brunswick, NJ, May 27 (2004).
- [49] Texas Instruments, Dallas, TX, May 18 (2004).
- [50] Brown University, Dept. of Chemistry, March 12 (2004).
- [51] University of California at Berkeley, Physical Chemistry Seminar, February 24 (2004).
- [52] Swiss Federal Institute of Technology (ETH), Quantum Optics Seminar, February 9 (2004).
- [53] Cornell University, Center for Nanoscale Systems, February 5 (2004).
- [54] Massachusetts Institute of Technology, Harrison Spectroscopy Lab., January 14 (2004).
- [55] Vanderbilt University, Department of Physics, September 10 (2003).
- [56] University of Siegen, Dept. of Physical Chemistry, Germany, July 18 (2003).
- [57] University of Dresden, Institute of Photophysics, Germany, July 17, 2003.
- [58] Max-Planck Institute for Biophysics, Goettingen, Germany, July 16, 2003.
- [59] University of Bielefeld, Department of Physics, Germany, July 14 (2003).
- [60] Ludwig Maximilian University, Department of Physics, Munich, Germany, July 11 (2003).
- [61] Max-Planck Institute for Biochemistry, Munich (Martinsried), Germany, July 10 (2003).
- [62] University of Basel, Department of Physics, Switzerland, July 7 (2003).
- [63] Swiss Federal Institute of Technology, Zurich, Switzerland, July 4, 2003.
- [64] University of Cincinnati, Department of Physics, May 19 (2003).
- [65] University of Chicago, James-Franck Institute, Chicago, May 13 (2003).
- [66] Eastman Kodak Company, April 22 (2003).

## **MEMBERSHIPS IN PROFESSIONAL ORGANIZATIONS**

- [1] Optical Society of America (Fellow).
- [2] American Physical Society.
- [3] American Association of Physics Teachers.
- [4] American Association for the Advancement of Science (Fellow).