

# Adam P. Wax

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## EDUCATION

### **Massachusetts Institute of Technology**, Spectroscopy Lab., Cambridge, MA

Postdoctoral training, August 1999 – August 2002  
Advisor: Dr. M. S. Feld

### **Duke University**, Physics Department, Durham, NC

Ph.D. Physics, May 1999, M.A. Physics, May 1996  
Dissertation: “Optical Phase Space Distributions for Coherence Tomography”  
Advisor: Dr. J. E. Thomas

### **Rensselaer Polytechnic Institute**, Troy, NY

B.S. Electrical Engineering, *cum laude*, May 1993

### **State University of New York at Albany**, Albany, NY

B.S. Physics, *cum laude*, May 1993

## PROFESSIONAL POSITIONS

**Associate Professor**, Dept. of Biomedical Engineering July 2008 – present

**Assistant Professor**, Dept. of Biomedical Engineering Sept. 2002 – June 2008

*Duke University, Durham, NC*

Established independent research program in biophotonics. Primary research application is early detection of cancer using light scattering and interferometry. Additional research areas include development of optical tools for cell biology applications and novel microscopy techniques.

**Founder and Chairman**, Oncoscope, Inc. June 2006 – present

*Durham, NC*

Founded company to commercialize technology developed at Duke University. Company has raised \$2.5MM in venture financing and \$1.5MM in non-dilutive financing to date.

**Faculty**, Medical Physics Graduate Program

*Duke University Medical Center, Durham, NC* July 2005 – present

Activities to date have included mentoring graduate students in thesis research.

**Postdoctoral Research Associate**, Spectroscopy Laboratory

*Massachusetts Institute of Technology, Cambridge, MA* Aug. 1999 – Aug. 2002

Developed low-coherence interferometry techniques for application to study biophysical properties of cells and tissues. Laboratory of M. S. Feld.

**Research Assistant**, Physics Department

*Duke University, Durham, NC* May 1994 – June 1999

Assisted in creation of new research in biomedical optics. Laboratory of J. E. Thomas.

**Laboratory Assistant**, Advanced Materials Laboratory

*SUNYA, Albany, NY* Oct. 1990 – Aug. 1991

Conducted independent research and assisted graduate students. Laboratory of A. Kaloyeros.

## **HONORS and AWARDS**

Fellow of the Optical Society of America  
Fellow of SPIE, the International Society for Optical Engineering  
FastTrac Tech Company of the Year – Oncoscope, Inc.  
First place Duke Startup Challenge – Oncoscope, Inc.  
Capers and Marion McDonald Award for Excellence in Teaching and Research  
W.H.Coulter Foundation Early Career Award  
NSF CAREER Award  
Chandran Research Award  
ORAU Ralph E. Powe Junior Faculty Enhancement Award  
Nomination for Packard Fellowship by Duke University  
NIH postdoctoral fellowship  
Whitaker Foundation conference fellowship  
OSA travel award  
Walter Gordy Fellowship  
Preparing Future Faculty Fellowship  
Teaching Physics Certificate

## **PROFESSIONAL SERVICE**

Membership and Education Services Council, Opt. Soc. Am. (2004-08)  
Past Chair (2008), Chairman (2006-2007), Vice-chair (2005), Member (2004)  
Board of Directors, Opt. Soc. Am. (2006-07)  
Optics in Biology and Medicine Division, Microscopy and OCT group, Opt. Soc. Am.,  
Chairman (2007-2009), Vice Chair (2005-2007)  
Science & Engineering Council, Opt. Soc. Am., member (2005-2009)  
Investment subcommittee, Opt. Soc. Am. (2008-2010)  
Associate Editor, Applied Optics 1<sup>st</sup> term 2004-2007, 2<sup>nd</sup> term 2007-2010  
Grant Review for National Science Foundation, National Institutes of Health and other funding agencies  
CLEO/QELS Technical Program Committee, Long Beach, CA, May 2006.  
Photonics West, Biomedical Applications of Light Scattering, Conference Chairman, 2007-2010  
CLEO/QELS Sub-committee Chairman, Baltimore, MD, May 2007.  
Frontiers in Optics (OSA annual meeting), conference committee, 2007-2010.

## **UNIVERSITY SERVICE**

Director of Master's program, BME dept. 2009-  
Director of Graduate Studies, Fitzpatrick Institute for Photonics, 2009-  
Engineering Faculty Council, J. Albertson, Chair, 2008, K. Hall, Chair, 2009  
Pratt Curriculum Committee, W. Grill, Chair, 2008-2009  
Pratt Master in Engineering Committee, J. Glass, Chair, 2008-  
BME graduate application screening committee, A. Chilkoti, Chair 2007-  
SPIE student chapter faculty advisor, 2006-  
Fitzpatrick Center outreach committee, Chair, 2006 –  
Fitzpatrick Center seminar series organizer 2005  
Research Use Laser Safety Committee, 2005 - 2007 , Ben E. Edwards, Chair  
BME Undergraduate curriculum committee, 2005 - 2006 , Fan Yuan, Chair  
Translational Activities and Entrepreneurship strategic planning committee, 2005 Barry Myers, Chair  
BME biophotonics faculty search committee, 2004-5, Joseph Izatt, Chair  
Fitzpatrick Center education committee, 2004 - 2006  
BME Graduation with Distinction poster award committee, 2004, Fan Yuan, Chair  
BME graduate affairs committee, 2003- 2006 , Barry Myers, Chair  
BME biophotonics faculty search committee, 2003-4, Joseph Izatt, Chair  
EE photonics faculty search committee, 2003-4, Qin Lu, Chair  
BME mission committee, 2002-3, Gregg Trahey, Chair

## **TEACHING EXPERIENCE**

Developed new courses on modern microscopy and advanced optics at Duke U. BME dept (BME 265).  
Responsible for all curriculum aspects of core BME instrumentation course at Duke U. (BME 154L/164L).  
Created and developed Teaching Physics Certificate program at Duke University.  
Lecturer for undergraduate physics courses (M.I.T. and Duke U.).  
Teaching assistant for graduate and undergraduate physics courses.  
Physics teacher for N.C. School of Science and Math, statewide magnet high school.

## **PEER-REVIEWED PUBLICATIONS**

Robles, F. E., and A. Wax, "Measuring morphological features using light-scattering spectroscopy and Fourier-domain low-coherence interferometry," *Opt. Lett.* **35**, 360-362 (2010)

Shaked, N.T., J.D. Finan, F. Guilak and A. Wax, "Quantitative phase microscopy of articular Chondrocyte dynamics by wide field digital interferometry," *J. Biomed. Opt.* **15**, 010505 (2010)

Graf, R.N., F. E. Robles, X. Chen and A. Wax, "Detecting precancerous lesions in the hamster cheek pouch using spectroscopic white-light optical coherence tomography to assess nuclear morphology via spectral oscillations," *J. Biomed. Opt.* **14**(6), 064030-064038 (2009)

Zhu, Y.Z., N. G. Terry, and A. Wax, "Scanning fiber angle-resolved low coherence interferometry," *Opt. Lett.* **34**, 3198-3198 (2009).

Shaked, N.T., Y.Z. Zhu, M. T Rinehart, and A. Wax, "Two-step-only phase shifting interferometry with optimized detector bandwidth for microscopy of live cells," *Opt. Express* **17**, 15585-15591 (2009).

Nusz, G. J., A.C. Curry, S.M. Marinakos, A. Wax, and A. Chilkoti, "Rational selection of gold nanorod geometry for label-free plasmonic biosensors," *ACS Nano* **3**, 795-806 (2009).

Shaked, N.T., M. T. Rinehart, and A. Wax, "Dual-interference-channel quantitative-phase microscopy of live cell dynamics," *Opt. Lett.* **34**, 767-769 (2009)

Robles, F., Graf, R. N. and A. Wax, "Dual window method for processing spectroscopic optical coherence tomography signals with simultaneously high spectral and temporal resolution," *Opt. Express* **17**, 6799-6812 (2009)

Chalut, K. J., J. H. Ostrander and A. Wax, "Light Scattering Measurements of Subcellular Structure Provide Noninvasive Early Detection of Chemotherapy-induced Apoptosis," *Canc. Res.* **69**, 1199-1204 (2009).

Crow, M.J., G. Grant, J. M. Provenzale and A. Wax, "Molecular Imaging and Quantitative Measurement of EGFR Expression in Live Cancer Cells Using Immunolabeled Gold Nanoparticles," *Am. J. Roentgenol.* **192**, 10.2214 (2009).

Amoozegar, C., M.G. Giacomelli, K. J. Chalut, J.D. Kenner, and A. Wax, "Experimental verification of T matrix based inverse light scattering analysis for assessing structure of spheroids as models of cell nuclei," *Appl. Opt.* **48**, D20-D25 (2009).

Drake, T. K., F. E. Robles, and A. Wax, "Multiplexed low coherence interferometry instrument for measuring microbicide gel thickness distribution," *Appl. Opt.* **48**, D14-D19 (2009).

Finan, J. D., K. J. Chalut, A. Wax, and F. Guilak, "Nonlinear osmotic properties of the cell nucleus," *Ann. Biomed. Eng.* **37**, 477-91 (2009).

Wax, A., and K. Sokolov, "Molecular imaging and darkfield microspectroscopy of live cells using gold plasmonic nanoparticles," *Laser & Photon. Rev.* **3**, 146-158 (2009).

Wallace, M.B., A. Wax, D.N. Roberts, and R. N. Graf, "Reflectance Spectroscopy," *GI Clinics of North America*, **19** 233-242 (2009).

- Wax, A. and J. W. Pyhtila, "In situ nuclear morphology measurements using light scattering as biomarkers of neoplastic change in animal models of carcinogenesis," *Disease Markers* **25**, 291-301 (2009).
- Giacomelli, M.G., K.J. Chalut, J.H. Ostrander, and A. Wax, "Application of the T-matrix method to determine the structure of spheroidal cell nuclei with angle-resolved light scattering," *Opt. Lett.* **33**, 2452-2454 (2008).
- Skala, M.C., M.J. Crow, A. Wax, and J.A. Izatt, "Photothermal Optical Coherence Tomography of Epidermal Growth Factor Receptor in Live Cells Using Immunotargeted Gold Nanospheres." *Nano Letters* **8**, 3461-3467 (2008).
- Nusz, G.J., S.M. Marinakos, A.C. Curry, A. Dahlin, F. Hook, A. Wax, and A. Chilkoti, "Label-free plasmonic detection of biomolecular binding by a single gold nanorod," *Anal. Chem.* **80**, 984-989 (2008).
- Chalut, K. J., S. Chen, J. Finan, M. Giacomelli, F. Guilak, K. Leong and A. Wax, "Label-free, high throughput measurements of dynamic changes in cell nuclei using angle-resolved low coherence interferometry," *Biophys. J.* **94**(12), 4948-4956 (2008).
- Graf, R. N. , W. J. Brown, and A. Wax, "Parallel frequency-domain optical coherence tomography scatter-mode imaging of the hamster cheek pouch using a thermal light source," *Opt. Lett.* **33**, 1285-1287 (2008).
- Chalut, K.J., M. Giacomelli, and A. Wax, "Application of Mie theory to assess structure of spheroidal scattering in backscattering geometries". *J. Opt. Sci. Am. A* **25**, pp. 1866-1874 (2008).
- Brown, W. J., J. W. Pyhtila, N. G. Terry, K. J. Chalut, T. A. D'Amico, T. A. Sporn, J. V. Obando, and A. Wax, "Review and recent development of angle-resolved low coherence interferometry for detection of pre-cancerous cells in human esophageal epithelium," *IEEE J. Sel. Top. Quant Elec.* **14**, 88-97 (2008).
- Curry, A. C., M. J. Crow and A. Wax, "Molecular imaging of EGFR in live cells with refractive index sensitivity using darkfield microspectroscopy and immunotargeted nanoparticles," *J. Biomed Opt.* **13**, 014022 (2008).
- Kelloff, G. J., D. C. Sullivan, H. Baker, ..., A. Wax, et al., "Workshop on imaging science development for cancer prevention and preemption," *Cancer Biomarkers* **3**, 1-33 (2007).
- Chalut, K. J., W. J. Brown, and A. Wax, "Quantitative phase microscopy with asynchronous digital holography," *Opt. Express* **15**, 3047-3052 (2007)  
<http://www.opticsinfobase.org/abstract.cfm?URI=oe-15-6-3047>
- Keener, J.D., K. J. Chalut, J. W. Pyhtila, and A. Wax, "Application of Mie theory to determine the structure of spheroidal scatterers in biological materials," *Opt. Lett.* **32**, pp. 1326-1328 (2007).
- Graf., R.N., and A. Wax, "Temporal coherence and time frequency distributions in spectroscopic optical coherence tomography," *J. Opt. Soc. Am. A* **24**, 2186-2195 (2007)
- Pyhtila J. W., K. J. Chalut, J. D. Boyer, J. Keener, T. A. D'Amico, M. A. Gottfried, F. Gress, and A. Wax "In situ detection of nuclear atypia in Barrett's esophagus using angle-resolved low coherence interferometry," *Gastrointestinal Endoscopy* **65**, 487-491 (2007).
- Chalut, K.J., L.A. Kresty, J. W. Pyhtila, R. Nines, M. Baird, V. E. Steele, and A. Wax, "In situ assessment of intraepithelial neoplasia in hamster trachea epithelium using angle-resolved low coherence interferometry," *Cancer Epidemiol Biomarkers Prev* **16**, 223-7 (2007).
- Pyhtila J. W., and A. Wax, "Polarization effects on scatterer sizing accuracy analyzed with frequency-domain angle-resolved low coherence interferometry," *Appl. Opt.* **46**, 1735-1741 (2007).
- Curry, A., G. Nusz, A. Chilkoti and A. Wax, "Analysis of total uncertainty in spectral peak measurements for plasmonic nanoparticle-based biosensors," *Appl. Opt.* **46**, 1931-1939 (2007).
- Hunter, M., V. Backman, G. Popescu, M. Kalashnikov, C. W. Boone, A. Wax, G. Venkatesh, K. Badizadegan, G. D. Stoner and M. S. Feld, "Tissue Self-Affinity and Light Scattering in the Born Approximation: A New Model for Precancer Diagnosis", *Phys. Rev. Lett.* **97**, 138102 (2006).

Curry, A. W. L. Hwang, and A. Wax, "Epi-illumination through the microscope objective applied to darkfield imaging and microspectroscopy of nanoparticle interaction with cells in culture," *Opt. Express* **14**, 6535-6542 (2006). <http://www.opticsinfobase.org/abstract.cfm?URI=oe-14-14-6535>

Pyhtila, J. W., H. Ma, A. J. Simnick, A. Chilkoti and A. Wax, "Analysis of long range correlations due to coherent light scattering due from in vitro cell arrays using angle-resolved low coherence interferometry," *J. Biomed. Opt.* **11**, 034022 (2006).

Braun, K. E., J. D. Boyer, M. H. Henderson, D. J. Katz, and A. Wax, "Label-free measurement of microbicidal gel thickness using low coherence interferometry," *J. Biomed. Opt.* **11**, 020504 (2006).

Pyhtila, J. W., J. D. Boyer, K. J. Chalut and A. Wax, "Fourier-domain angle-resolved low coherence interferometry through an endoscopic fiber bundle for light scattering spectroscopy," *Opt. Lett.* **31**, 772-774 (2006).

Graf, R. N. and A. Wax, "Nuclear morphology measurements using Fourier domain low coherence interferometry," *Opt. Express* **13**, pp. 4693-4698 (2005),  
<http://www.opticsexpress.org/abstract.cfm?URI=OPEX-13-12-4693>

Wax, A., Pyhtila, J. W., Graf, R. N., Nines, R., Boone, C. W., Dasari, R. R., Feld, M. S., Steele, V. E., Stoner, G. D., "Prospective grading of neoplastic change in rat esophagus epithelium using angle-resolved low coherence interferometry," *J. Biomed. Opt.* **10**, 051604 (2005).

Curry, A., G. Nusz, A. Chilkoti, and A. Wax, "Substrate effect on refractive index dependence of plasmon resonance for individual silver nanoparticles observed using darkfield microspectroscopy," *Opt. Express* **13**, 2668-2677 (2005), <http://www.opticsexpress.org/abstract.cfm?URI=OPEX-13-7-2668>.

Pyhtila, J. W., Wax, A., "Improved interferometric detection of scattered light using a 4f imaging system," *Applied Optics* **44**, pp. 1785-1791 (2005).

Chou, D. R., Bower, B. A., Wax, A., "Low-cost, scalable laser scanning module for real-time reflectance and fluorescence confocal microscopy," *Applied Optics* **44**, pp. 2013-2018 (2005).

Wax, A., "Low Coherence Light Scattering Calculations for Polydisperse Size Distributions," *J. Opt. Soc. Am. A* **25**, pp. 256-261 (2005).

Ahn, A., Yang, C., Wax, A., Popescu, G., Fang-Yen, C. Badizadegan, K., Dasari, R. R., and Feld, M. S., "Harmonic Phase Dispersion Microscope with a Mach-Zender Interferometer," *Applied Optics* **44**, pp. 1188-1190 (2005).

Pyhtila, J. W., and Wax, A., "Rapid, depth-resolved light scattering measurements using Fourier domain, angle-resolved low coherence interferometry," *Opt. Express* **12**, 6178-6183 (2004),  
<http://www.opticsexpress.org/abstract.cfm?URI=OPEX-12-25-6178>

Iwai, H, Fang-Yen, C., Popescu, G., Wax, A., Badizadegan, K., Dasari, R. R., Feld, M. S., "Quantitative phase imaging using actively stabilized phase-shifting low-coherence interferometry," *Optics Letters* **29**, pp. 2399-2401 (2004).

Pyhtila, J. W., Graf, R. N., Wax, A., "Determining nuclear morphology using an improved angle-resolved low coherence interferometry system," *Opt. Express* **11**, pp. 3473-3484 (2003),  
<http://www.opticsexpress.org/abstract.cfm?URI=OPEX-11-25-3473>

Tunnell JW, Desjardins A, Galindo L, Mirkovic J, McGee SA, Nguyen FT, Zhang Q, Muller M, Wax A, Georgakoudi I, Dasari RR, Feld MS, "Instrumentation for multimodal spectroscopic diagnosis of epithelial dysplasia.," *Technol Cancer Res Treat* **2**, pp. 505-514 (2003).

Wax, A., Yang, C., Izatt, J.A., "Fourier domain low-coherence interferometry for light scattering spectroscopy," *Optics Letters* **28** pp. 1230-1232 (2003).

- Wax, A., Yang, C., Müller, M., Nines, R., Boone, C.W., Steele, V.E., Stoner, G.D., Dasari, R.R., Feld, M.S., "In situ detection of neoplastic transformation and chemopreventive effects in rat esophagus epithelium using angle-resolved low-coherence interferometry," *Cancer Research* **63**, pp. 3556-3559 (2003).
- Müller, M.G., Wax, A., Georgakoudi, I., Dasari, R.R., Feld, M.S., "A reflectance spectrofluorimeter for real-time spectral diagnosis of disease," *Rev. Sci. Inst.* **73**, pp. 3933-3937 (2002).
- Wax, A., Yang, C., Backman, V., Badizadegan, K., Boone, C. W., Dasari, R. R., Feld, M. S., "Cellular organization and sub-structure measured using angle-resolved low coherence interferometry," *Biophys. J.* **82**, pp. 2256-2264 (2002).
- Wax, A., Yang, C., Backman, V., Kalashnikov, M., Dasari, R. R., Feld, M. S., "Determination of particle size using the angular distribution of backscattered light as measured with low-coherence interferometry," *J. Opt. Soc. Am. A* **19**, pp. 737-744 (2002).
- Yang, C., Wax, A., Dasari, R. R., Feld, M.S., " $2\pi$  ambiguity - free optical distance measurement with sub-nanometer precision using a novel phase-crossing low coherence interferometer," *Opt. Lett.* **27**, pp. 77-79 (2002).
- Backman, V., Gopal, V., Kalashnikov, M., Badizadegan, K., Gurjar, R., Wax, A., Georgakoudi, I., Mueller, M., Boone, C. W., Dasari, R. R., Feld, M. S., "Measuring cellular structure at the sub-micron scale with light scattering spectroscopy," *IEEE J Sel Top Quantum Electron* **7**, pp. 887-893 (2001).
- Yang, C., Wax, A., Badizadegan, K., Dasari, R. R., Feld, M. S., "Phase-referenced interferometer with subwavelength and subhertz sensitivity," *Optics and Photonics News* **12**, p. 36 (2001).
- Yang, C., Wax, A., Hahn, M. S., Badizadegan, K., Dasari, R. R., Feld, M. S., "A phase-referenced interferometer with sub-wavelength and sub-Hertz sensitivity applied to the study of cell membrane dynamics," *Opt. Lett.* **26**, pp.1271-1273 (2001).
- Yang, C., Wax, A., Dasari, R. R., Feld, M. S., "Phase dispersion optical tomography," *Opt. Lett.* **26**, pp.686-688 (2001).
- Wax, A., Yang, C., Dasari, R. R., Feld, M. S., "Measurement of angular distributions using low-coherence interferometry for light scattering spectroscopy," *Opt. Lett.* **26**, pp.325-327 (2001).
- Wax, A., Yang, C. H., Dasari, R. R., Feld, M. S., "Path-length resolved dynamic light scattering: modeling the transition from single to multiple scattering," *Appl. Opt.* **40** (21), pp. 4222-4227 (2001).
- Yang, C. H., Wax, A., Feld, M. S., "Measurement of Anomalous Phase Velocity of Ballistic Light in a Random Medium using a Novel Interferometer," *Opt. Lett.* **26**, pp. 235-237 (2001).
- Yang, C. H., Wax, A., Georgakoudi, I., Hanlon, E., Badizadegan, K., Dasari, R. R., Feld, M. S., "Interferometric Phase Dispersion Microscopy," *Opt. Lett.* **25**, pp. 1526-1528 (2000).
- Wax, A., Bali, S. and Thomas, J. E., "Time-Resolved Phase-Space Distributions for Light Backscattered from a Disordered Medium," *Phys. Rev. Lett.* **85**(1), pp. 66-69 (2000).
- Yang, C. H., Perelman, L. T., Wax, A., Dasari, R. R., and Feld, M. S., "Feasibility of Field-Based Light Scattering Spectroscopy," *J. Biomed. Opt.* **5**(1) pp.138-143 (2000).
- Lee, K. F., Reil, F., Bali, S., Wax, A. and Thomas, J. E., "Heterodyne Measurement of Wigner Distributions for Classical Optical Fields," *Opt. Lett.* **24**, pp. 1370-1372 (1999).
- Wax, A., Bali, S. and Thomas, J. E., "Optical Phase Space Distributions for Low-Coherence Light," *Opt. Lett.* **24**, pp. 1188-1190 (1999).
- Wax, A., Bali, S. and Thomas, J. E., "Coherence Characterization of Broadband Sources Using Optical Phase Space Contours," *J. Biomed. Opt.* **4**(4), pp. 482-489 (1999).

Wax, A. and Thomas, J. E. "Measurement of Smoothed Wigner Phase Space Distributions in Multiple Scattering Media," in *Advances in Optical Imaging and Photon Migration*, J. G. Fujimoto and M. S. Patterson, Eds., Vol. **21** of OSA Trends in Optics and Photonics (Optical Society of America, Washington, D. C., 1998), pp.348-352.

Wax, A. and Thomas, J. E., "Measurement of Wigner phase space distributions for multiple small angle scattering in a turbid medium," *J. Opt. Soc. Am. A* **15**, pp.1896-1908 (1998).

Wax, A. and Thomas, J. E., "Optical heterodyne imaging and Wigner phase space distributions," *Optics Letters*, v.**21**, 1427-9 (1996).

Wax, A. and Thomas, J. E., "Heterodyne measurement of Wigner phase space distributions in turbid media," in *Advances in Optical Imaging and Photon Migration*, R. R. Alfano and J. G. Fujimoto, eds., Vol. **2** of OSA Trends in Optics and Photonics (Optical Society of America, Washington, D. C., 1996), pp.238-242.

## **INVITED PRESENTATIONS**

"Nanoscale imaging and sensing for proteomics," A. Wax, *Advances in Optics for Biotechnology, Medicine and Surgery XI*, Burlington, VT, June 2009.

"Detecting neoplastic development in the hamster cheek pouch using Fourier domain low coherence interferometry," R. N. Graf, A. Wax, SPIE Photonics West, San Jose, CA, January, 2009

"Analyzing Light Scattering from Aspherical Nuclei for Cell Biology and Clinical Applications," A. Wax, *Frontiers in Optics*, OSA annual meeting, Rochester, NY, Oct 2008.

"Darkfield Microspectroscopy: From Single Nanoparticle Biosensing to Live Cell Molecular Imaging," A. Wax, OSA Biomed topical meeting, St. Petersburg, FL, March 2008.

"Detection of structural and functional changes in biological materials using angle-resolved low coherence interferometry." K. Chalut, A. Wax, SPIE Photonics West, San Jose, CA, January, 2008.

"Molecular Imaging and Microspectroscopy of Live Cells Using Immunotargeted Nanoparticles," A. Wax, OSA annual meeting, San Jose, CA, September, 2007.

"Detecting precancerous activity in the human esophagus with angle-resolved low-coherence interferometry," J. Pyhtila, A. Wax, SPIE Photonics West, San Jose, CA, January, 2007.

"Detecting Pre-Cancerous Cells in the Human Esophagus with Angle-Resolved Low Coherence Interferometry," A. Wax, Workshop on Small Animal Imaging, Duke University, Durham, NC, November 2006

"Detecting Pre-Cancerous Cells in the Human Esophagus with Angle-Resolved Low Coherence Interferometry," A. Wax, Division of Chemoprevention Colloquium, NIH, Rockville, MD, November 2006

"Development of fLCI (Low Coherence Interferometry) as a Clinical Tool for Detecting Malignancy," A. Wax, International Diffuse Reflectance Conference, Chambersburg, PA, August 2006.

"Detecting Pre-Cancerous Cells in the Human Esophagus with Angle-Resolved Low Coherence Interferometry," A. Wax, NCI Workshop on Imaging Science Development for Cancer Prevention and Preemption, Bethesda, MD, July 2006.

"Detecting Pre-Cancerous Cells in the Esophagus with Angle-Resolved Low Coherence Interferometry," A. Wax, Endoscopy Research Conference, Duke University, April 2006.

"Biophotonics for early cancer detection," A. Wax, Sensorsgov conference, Hampton, VA, Dec. 2005.

"Optical Characterization of Nanoparticles for Biosensing Applications," A. Wax, Fitzpatrick Center Annual Meeting, Duke University, May 2005

"Real-time angle-resolved low-coherence interferometer for detecting pre-cancerous cells" A. Wax, FiO/OSA annual meeting, Rochester, NY Oct. 2004

"Detecting pre-cancerous cells using angle-resolved low coherence interferometry," A. Wax, Biomedical optics, OSA topical meeting, Miami, FL, Apr. 2004

“Detecting Pre-Cancerous Cells using Light Scattering and Interferometry,” A. Wax, Optics in the Southeast OSA Topical Meeting, U. Central Florida, Orlando, Nov. 2003

“Detecting Pre-Cancerous Cells using Light Scattering and Interferometry,” A. Wax, Fitzpatrick Center Annual Meeting, Duke University, May 2003.

“Probing cell dynamics with low coherence interferometry,” A. Wax, Gordon Research Conference, June 2002.

“Precision low-coherence interferometry for cell biology,” A. Wax, United Engineering Foundation Conference, Banff, Alberta, Canada, 2001.

“Interferometric Phase-Based Biomedical Measurements - Dialogue between a cell-biologist and an optical engineer,” C. Yang and A. Wax, Gordon Research Conference on Lasers in Medicine and Biology, New London, CT, 2000.

“Measurement of Smoothed Wigner Phase Space Distributions for Low Coherence Light in Multiple Scattering Media,” A. Wax and J. E. Thomas, Photonics West, BiOS '99, San Jose CA, 1999.

### **INVITED SEMINARS**

“Detecting Pre-Cancerous Cells with Angle-Resolved Low Coherence Interferometry,” A. Wax, Physics Colloquium, East Carolina University, Greenville, NC, October 2006

“Detecting Pre-Cancerous Cells with Angle-Resolved Low Coherence Interferometry,” A. Wax, Seminar on Bioengineering, California Institute of Technology, May 2006.

“Detecting Pre-Cancerous Cells with Angle-Resolved Low Coherence Interferometry,” A. Wax, Seminar on Biomedical Engineering, Beckman Laser Institute, UC Irvine, May 2006.

“Detecting Pre-Cancerous Cells in the Esophagus with Angle-Resolved Low Coherence Interferometry,” A. Wax, BioDesign & Bioengineering Seminar, Stanford University, Jan 2006.

“Detecting Pre-Cancerous Cells in the Esophagus with Angle-Resolved Low Coherence Interferometry,” A. Wax, Biomedical Engineering Seminar Series, Northwestern University, Jan 2006.

“Detecting Pre-Cancerous Cells in the Esophagus using Angle-Resolved Low Coherence Interferometry,” A. Wax, Seminar, Dartmouth College/Norris Cotton Cancer Center, July 2004

“Detecting pre-cancerous cells using angle-resolved low coherence interferometry ,” A. Wax, Medical Physics Seminar, Duke Univ., Apr. 2004

“Probing Living Cells with Light Scattering and Low-Coherence Interferometry,” A. Wax, Special Colloquium, University of Arizona, Optical Sciences Department, Apr. 2002.

“Probing Living Cells with Light Scattering and Low-Coherence Interferometry,” A. Wax, Seminar, Duke University, Dept. of Biomedical Engineering, Apr. 2002.

“Studying the Living Cell with Light Scattering and Low-Coherence Interferometry,” A. Wax, Applied and Engineering Physics Seminar, Cornell University, March 2002

“Studying the Living Cell with Light Scattering and Low-Coherence Interferometry” A. Wax, Optics Colloquium, University of Rochester, Institute of Optics, Feb. 2002

“Studying the Living Cell with Light Scattering and Low-Coherence Interferometry,” A. Wax, Photomedicine lecture, Wellman Laboratories for Photomedicine, Massachusetts General Hospital, Feb. 2002

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**CONTRIBUTED PAPERS**

- 100 presentations at workshops, national and topical meetings, 30 publications in conference proceedings.