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Highlights of Scientific Publications, Presentations and Activities

- 110 (50 invited) presentations at international and national conferences
- 48 invited seminars
- 1 invited chapter in *Encyclopedia of Nanoscience and Nanotechnology*
- 1 invited chapter in *Handbook of Nanostructured Biomaterials and Their Applications in Nanobiotechnology*
- Organized and chaired 14 symposia at *Pittcon* (7), *FACSS* (3), *Photonic West (SPIE)* (3), and ACS national meeting (1)
- Grant reviewer (panelist) for 10 funding agencies (NIH, NSF, EPA, DoE, DoD, NAS, ACS, USCRDF, DGF, HKRGC)
- 1 book review in *JACS*
- Editor of 1 book for a Wiley Chemical Analysis Series (2007)
- Taught 15 different graduate and undergraduate courses
- Biological Chemistry Track Director (Coordinator) of PhD program in Biomedical Sciences

Research Highlights

- **"**Silver Nanoparticles Monitored *in Vivo*", C&EN, P. 36, October 15 (**2007**)
- "Mission to the Inside of a Living Cell", National Cancer Institute Alliance for Nanotechnology in Cancer, Monthly Feature, May (**2006**)
  http://nano.cancer.gov/news_center/monthly_feature_2006_may.asp
- "New Technique Shows Mechanism for Antibiotic Resistance", Biophotonics International, *January/February*, 62-63 (**2003**)
- "Trapping at Long Range", Science, *281*, 1569 (**1998**)
- "Imaging Single Molecules in Motion", C&EN, p. 10, Feb. 24 (**1997**)
- "Singling Out Molecules", Science, *275*, 1041 (**1997**)
- "Electrostatic Trapping Causes Retention", Anal. Chem., *70*, 703A (**1998**)
- "Continuous Single-Molecule Monitoring", Anal. Chem., *69*, 223A (**1997**)

Patents

- **X. Xu***, P. Nallathamby, K. Lee, "Stable Nanoparticles, Nanoparticle-Based Imaging Systems, Nanoparticle-Based Assays", US Patent, (filed in Aug. 2008; pending).
- **X. Xu***, T. Huang, P. Nallathamby **"**Nanoparticle Biosensors", US Patent, (filed in Sept. 2008; pending).
- **X. Xu***, R. Jeffers, S. Kyriacou, "Unconventional Drugs for Inhibition of Bacterium Growth", US Patent, (filed in June, 2001; pending).
- **X. Xu** and Allen J. Bard, "Biosensor for and Method of Electrogenerated Chemiluminescent Detection of Nucleic Acid Adsorbed to a Solid Surface", Worldwide Patent (filed on August 2, 1994), Canadian Patent Application No. 2198489, Australian Patent No. 703344 (sealed August 7, 1999), World Intellectual Property Organization No. WO9606946A1 (issued March 7, 1996), European Patent Application No. EP00777741A1 (1997). Licensed to IGEN, Inc in 1996.

Education

Postdoctoral Fellow	Ames Lab/US-DOE, Iowa State University, 1996-98
Area	Single molecule analysis/spectroscopy (**Edward S. Yeung**, mentor)
Postdoctoral Fellow	The University of Texas at Austin, 1993-95
Area	Bioelectroanalytical/electrochemistry (**Allen J. Bard**, mentor)
Doctor of Philosophy	The University of Mississippi, Dec. 1992
Major	Electrochemistry/Analytical Chemistry (**Charles L. Hussey**, mentor)
Master of Science	Xiamen University, China, 1987-1989
Major	Physical chemistry (**Zhao-Wu Tian**, mentor)
Bachelor of Science	Xiamen University, China, 1985
Major	Physical chemistry

Professional Positions

Professor (tenured): Dept. of Chem. and Biochem., Old Dominion University, 2009-present
Biological Chemistry Track Director of Ph.D. program in Biomedical Sciences, 2001-present
Associate Professor (tenured): Dept. of Chem. and Biochem., Old Dominion University, 2004-2008
Assistant Professor: Dept. of Chem. and Biochem., Old Dominion University, 08/1998-2003

Initiated and established the following novel research projects:

1) Design of biocompatible nanomaterials for probing living cellular functions
2) Nanoscale analysis and sensing on single living cells and embryos
3) Single-molecule study of dynamics and interactions of self-assembly of protein molecules
4) Real-time study of membrane transport and multidrug resistance mechanisms of single living cells using single nanoparticle optics and single live cell imaging
5) Development of real-time single-molecule, single-cell and single nanoparticle microscopy
6) Real-time molecular study of effects of electric and magnetic (EM) fields on subcellular responses

Postdoctoral Fellow: Ames Lab/US-DOE, Iowa State University (1996-98)
Mentor: **Prof. Edward S. Yeung**, Distinguished Professor in Chemistry

Initiated, performed and established the following novel research projects:

1) Development of novel detection configurations and approaches for single-molecule analysis
2) Real-time measurement of single-molecule dynamics and reactions in free solution
3) Real-time monitoring of molecular interaction at liquid/solid interfaces at single-molecule level
4) Published 2 papers in *Science*

Postdoctoral Fellow: Dept. of Chem. and Biochem., UT at Austin (1993-95)
Mentor: **Prof. Allen J. Bard**, Member of National Academy of Sciences

Initiated and developed the following novel research projects:

1) Developed and characterized organic films for immobilization and sensing of DNA
2) Developed novel DNA biosensors with electrochemiluminescent (ECL) detection
3) Sensing DNA using QCM, ECL, FTIR and surface techniques (e.g., TEM, AFM, SECM)
4) Study ECL emission of a fluorescence quenching compound and adsorbed species on electrodes
5) Published 3 papers in *JACS*, 1 paper in *Langmuir*, and created 1 worldwide patent.

Research Assistant: Dept. of Chem. and Biochem., The University of Mississippi (1989-92)
Mentor: **Prof. Charles L. Hussey**, Chair

Initiated and established the following novel Research Projects:

1) Developed novel methods for electrochemical investigation of metals in room-temperature chloroaluminate molten salt (melts, ionic liquid).
2) Described the first nucleation mechanism of metal deposition in such melts.
3) Reported on the first two metals ever deposited from both acidic and basic melts.
4) Published 6 papers in *Journal of Electrochemical Society* and 1 in *Proc. of International Symposium on Molten Salt Chemistry & Technology*

Selected Honors and Awards

- Recipient of 2009 Distinguished Research Award of College of Sciences at ODU
- Recipient of 2008 Nanotech Briefs Nano 50™ Innovator Award
- Recipient of 2007 Nanotech Briefs Nano 50™ Awards in the Technology
- Student-selected Most Inspiring Faculty Member, College of Sciences, ODU, 2007
- Student-selected seminar speaker (one per year), University of Illinois at Urbana-Champaign, 2005
- Student-selected Most Inspiring Faculty Member, College of Sciences, ODU, 2005
- Student-selected Most Inspiring Faculty Member of ACS student local section, 2002
- Recipient of Scholarship of The University of Mississippi, 1989-1992
- Recipient of Outstanding Student Fellowship, Xiamen University, China, 1983-1985

Selected Professional Activities

Invited grant reviewer

Membrane of following NIH Study Sections:

NIH Panelist on Super Fund (NIEHS) (2009)
NIH Bioengineering Sciences & Technologies (BST)- Nanotechnology (2007-08)
NIH Instrumentation and Systems Development (2007);
NIH Special Emphasis Panel on Nanotechnology (ZRG1 BCMB-H) (2006)
NIH/NCI Innovative Technologies for the Molecular Analysis of Cancer (2006)
NIH Microscopic Imaging (ZRG1 MI-01) (2004, 2006)
NIH Biomedical Imaging Technologies (2003-2004)
NIH Panelist on Biosensor Core (NIEHS) (2002)

NSF Panelist:

NSF Panelist on MRI and CCI (2009)
NSF Panelist on CRIF (2007)
NSF Panelist on Technology (2006)
NSF Panelist on Biosensors (2003-2004)
NSF/MSP Targeted Panel #13-MSPT1304 (Presidential educational act) (2004)
NSF Panelist on Biophotonics (2000-2002, 2007)

EPA Panelist:

EPA Panelist on Impacts of Nanomaterials on Human Health (2004, 2007)

Invited grant mail-reviewer:

National Academy of Sciences (NAS)
Department of Energy (DoE)
American Chemical Society (ACS)
U.S. Civilian Research and Development Foundation (US State Dept.)
US Army Medical Research and Material Command (USAMRMC) (DoD)
German Research Foundation (DGF = NSF in US)
Hong Kong Research Grants Council (HKRGC)

Invited textbook reviewer:

Physical Chemistry, P. Atkins and J. Paula, W.H. Freeman (2001)

Invited program committee member:

Bios symposium at Photonics West-SPIE's International Symposium on Biomedical Optics, **2000-07**.

Invited peer reviewer:

Journal of American Chemical Society;	*Journal of Physical Chemistry*
Analytical Chemistry;	*Biochemistry*
J. of Proteome Research;	*Journal of the Electrochemical Society*
The Analyst;	*ACS Nano*
Nano Letters;	*Applied Spectroscopy*
Spectroscopy;	*Biotechnology Progress*
Journal of Quantum Electronics;	*Encyclopedia of Analytical Chemistry*

Organized and chaired invited symposia at Pittcon, FACSS, Photonics West, ACS:

- **"**Bioanalytical Applications of Single Molecule Detection and Spectroscopy" at **Pittcon' 2007**
- "Novel Luminescent Labels and Detection Strategies" at **Pittcon' 2006**
- "New Frontiers in Ultrasensitive Analysis: nanobiotech, single molecule detection, and single cell analysis"at **230th ACS National Meeting, 2005**
- "Biomedical Analysis Using Various Spectroscopic Methods" at **Pittcon' 2005**
- "Advances in Biomedical Sciences" and "Advances in Drug Discovery" at **Pittcon' 2004**
- "Emerging Ultrasensitive Tools in Bioanalysis" at **The 2002 SPIE**
- "Emerging New Tools for Biomedical Applications II" at **The 2002 SPIE**
- "Emerging Ultrasensitive Technologies for Earlier Detection" at **The 2001 SPIE**
- "Bioanalysis in Cells and Tissues" at **Pittcon' 2001**
- "Emerging Applications of Single-Molecule Analysis in the 21st Century" at **Pittcon' 2000**
- "Ultrasensitive Detection in Bioanalysis" at **FACSS' 2000**
- "Single-Molecule Detection for Biological Analysis" at **The 1999 FACSS & 45th ICASS**
- "Novel Approaches for Ultrasensitive Bioanalysis" at **The 1999 FACSS & 45th ICASS**

Grants Awarded

NSF

- NSF/NIRT (BES 0507036) [$1,256,494; 06/01/2005-05/31/2009] (PI: Xu)

  Title: NIRT: Design of Biocompatible Nanoparticles for Probing Living Cellular Functions and Their Potential Environmental Impacts; Supported by Division of Bioengineering & Environmental Systems (BES) at NSF

- NSF/GRA Supplement (CBET 0507036) [$40,738; 09/2009-05/31/2010] (PI: Xu)
- NSF/GRA Supplement (CBET 0507036) [$35,486; 08/2008-05/31/2009] (PI: Xu)
- NSF/GRA Supplement (CBET 0507036) [$34,176; 07/2007-05/31/2009] (PI: Xu)
- NSF/Research Supplement (BES 0542582) [$100,000; 08/2005-05/31/2009] (PI: Xu)
- NSF/GRA Supplement (BES 0541661) [$32,346; 07/2005-05/31/2009] (PI: Xu)
- NSF/RET Supplement for NIRT (BES 0507036) [$10,000; 07/2005-05/31/2009] (PI: Xu)
- NSF/GRA Supplement for NIRT (BES 0631940) [$33,081; 08/2006-05/31/2009] (PI: Xu)
- NSF (MRI: DMR 0420304) [Equipment fund: $119,000; 07/2004-06/2007] (Co-PI: Xu)

  Title: Acquisition of an Ultrahigh Vacuum Scanning Tunneling Microscope

NIH

- NIH (R01 GM0764401) [$1,246,431; 05/2006-05/2011] (PI: Xu)

  Title: Nanoassay for Real-time Molecular Probing ABC Transporter
- NIH (3R01GM076440-04S1) [$430,387; 10/2009-09/2012] (PI: Xu)

  Title: Nanoassay for Real-time Molecular Probing ABC Transporter
- NIH (3 R01 GM076440-01S1) [$84,910; 07/2006-04/2008] (PI: Xu)

  Title: GRA Supplement for Nanoassay for Real-time Molecular Probing ABC Transporter
- NIH (RR15057-01) [$214,500; 04/2000-03/2004] (PI: Xu)

  Title: Real-Time Single-Molecule Chemical Microscopy

  ODU provides an additional equipment-matching fund at $40,000 for this grant.

DOE

- Department of Energy (DE-FG02-03ER63646) [$236,512; 09/03-08/06] (Co-PI: Xu)

  Title: Real-Time Molecular Study of Bystander Effect Using Living Cell Imaging and Nanoparticle Optics;

DoD

- Air Force Office of Scientific Research (AFOSR #F49620-02-1-0320) [Multidisciplinary University Research Initiative (MURI), total costs: $5 million, 06/02-05/07] (Co-PI: Xu);

  Title: MURI-02: Subcellular Responses To Narrowband And Wideband Radiofrequency Radiation

  This project is carried out by a team of scientists and engineers in 7 universities, including K. Schoenbach (PI), Co-PIs: **X. Xu** and R. Joshi at ODU, S. Beebe at EVMS, J. Weaver at MIT, J. Roti-Roti Washington Univ. School of Medicine, M. Meltz, N. Mohan and S. Weintraub at UT-Health Science Center in San Antonio, S. Hagness and J. Booske at Univ. of Wisconsin-Madison. Old Dominion University is the leading institution of this project.
- Air Force Office of Scientific Research (AFOSR) [$12,000; 05/2003-09/2004] (Co-PI: Xu)
  Equipment award at $12,000

Others

- Ministry of Health and Sciences of Japan, total costs: $26,000 (12/1999-06/2000) (PI: Xu)

  Title: Single-Molecule Probing of Extrusion Pump Machinery
- ODU Summer Research Fellowship at $6,500 (06/1999-08/1999) (PI: Xu)

  Title: Single-Molecule Detection for Earlier Disease Diagnosis

ODU Undergraduate Fellowships*

- ODU Honor College Undergraduate Research Program for Jill Lowman, 2008.
  Title: Biocompatibility Study of Ferromagnetic Nanoparticles *In Vitro* (PI: Xu)

* These fellowships allow undergraduate students to pursuer their research programs in our lab. Many of them went on for graduate schools.

- ODU Honor College Undergraduate Research Program for Jill Lowman, 2007.
  Title: Study of Monolayer Protected Gold Nanoparticles in Medium (PI: Xu)
- ODU Honor College Undergraduate Research Program for Vassiliki Pravodelov, 2006.
  Title: Study of Nanowires and its Surface Functioning (PI: Xu)
- ODU Honor College Undergraduate Research Program for Renee Baker, 2004.
  Title: Study of Interactions of Biomolecules with Nanoparticles (PI: Xu)
- ODU Honor College Undergraduate Research Program for Juan Rodriguez, 2002.
  Title: Synthesis and Characterization of Silver Nanoparticles (PI: Xu)
- ODU Honor College Undergraduate Research Program for Michelle Nowake, 2001. (PI: Xu)
  Title: Probing of Multi-antibiotic Efflux Pump Machinery Using Fluorescence Spectroscopy
- ODU Academic Honor College Undergraduate Research Program for Khalid Salaita, 2000.
  Title: Study of Gold Nanoparticles (PI: Xu)

Student Thesis and Dissertation

1. S. V. Kyriacou (mentor: **X. Xu**), "Real-time study of multidrug resistance mechanism in *Pseudomonas aeruginosa* using nanoparticle optics and single live cell imaging". Thesis. Old Dominion University, Norfolk, VA (2003).
2. William J. Brownlow (mentor: **X. Xu**), "Development of single nanoparticle optical assays for imaging single living cells". Thesis. Old Dominion University, Norfolk, VA (2006).

Selected Publications: Books, Chapters, Book Reviews, and *Papers

*38. Y. Song, P. Nallathamby, T. Huang, H. Elsayled-Ali, **X. Xu***, "Correlation and Characterization of 3D Morphological Dependent Localized Surface Plasmon Resonance Spectra of Single Silver Nanoparticles Using Dark-field Optical Microscopy and Spectroscopy and AFM", *J. Phys. Chem. C.* (2009) (ASAP article Nov. 4, 2009; DOI: 10.1021/jp9083019)

*37. H. Xu, P. D. Nallathamby, **X. Xu***, "Real-time Imaging and Tuning Subcellular Structures and Membrane Transport Kinetics of Single Live Cells at Nanosecond Regime", *J. Phys. Chem. B.* **113**, 14393-14404 (2009).

36. L. Browning, K. J. Lee, T. Huang, P. D. Nallathamby, J. Lowman, X. Xu, "Random walk of single gold nanoparticles in zebrafish embryos leading to stochastic toxic effects on embryonic developments", *Nanoscale* 1, 138-152 (2009).

*35. T. Huang, P. Nallathamby, **X. Xu***, "Photostable single-molecule nanoparticle optical biosensors for real-time sensing of single cytokine molecules and their binding reactions", *J. Am. Chem. Soc.* **130**, 17095-17105 (2008).

*34. P. Nallathamby, K. Lee, **X. Xu***, "Design of stable and uniform single nanoparticle photonics for *in vivo* dynamics imaging of nanoenvironments of zebrafish embryonic fluids", *ACS Nano*, **2**, 1371-1380 (2008).

*33. T. Huang, P. D. Nallathamby, D. Gillet, and **X. Xu***, "Design and synthesis of single nanoparticle optical biosensors for imaging and characterization of single receptor molecules on single living cells", *Anal. Chem*. **79**, 7708-7718 (2007).

*32. K. J. Lee, P. D. Nallathamby, L. Browning, C. J. Osgood, **X. Xu***, "*In vivo* imaging of transport and biocompatibility of single nanoparticles in early development of zebrafish embryos", *ACS Nano,* **1**, 133-143 (2007). (Most-Accessed Article of 2007; Featured in *Chemical and Engineering News*, P. 36, Oct. 15 (2007)).

31. **X. Xu**[*], Editor; "New Frontiers in Ultrasensitive Bioanalysis: Advanced Analytical Chemistry Applications in Nanobiotechnology, Single Molecule Detection, and Single Cell Analysis", a Wiley Chemical Analysis Series, 2007 **(invited)**.

30. **X Xu**[*], Y. Song, P. Nallathamby, "Probing membrane transport of single live cells using single molecule detection and single nanoparticle assay" *in New Frontiers in Ultrasensitive Bioanalysis: Advanced Analytical Chemistry Applications in Nanobiotechnology, Single Molecule Detection, and Single Cell Analysis*, **X. Xu**, Ed., Wiley, Chapter 3, 41-70, 2007.

29. **X. Xu**[*], Y. Zu, "New bioanalytical applications of electrochemiluminescence" in *New Frontiers in Ultrasensitive Bioanalysis: Advanced Analytical Chemistry Applications in Nanobiotechnology, Single Molecule Detection, and Single Cell Analysis*, **X. Xu**, Ed., Wiley, Chapter 11, 235-267, 2007.

28. **X. Xu**[*], "Outlooks of ultrasensitive detection in bioanalysis" in *New Frontiers in Ultrasensitive Bioanalysis: Advanced Analytical Chemistry Applications in Nanobiotechnology, Single Molecule Detection, and Single Cell Analysis*, **X. Xu**, Ed., Wiley, Chapter 13, 295-299, 2007.

27. **X. Xu**[*], R. Patel, "Imaging and assembly of nanoparticles in biological systems" in *Handbook of Nanostructured Biomaterials and Their Applications in Nanobiotechnology*, H. S. Nalwa, Ed., American Scientific Publishers, Vol. 1, Chapter 13, 435-456, 2005 (**invited**).

*26. **X. Xu**[*], W. Brownlow, S. Kyriacou, Q. Wan, J. Viola, "Real-time probing of membrane transport in living microbial cells using single nanoparticle optics and living cell imaging", *Biochemistry* **43**, 10400-10413 (2004).

*25. **X. Xu***, S. Huang, W. Brownlow, K. Salatia, R. Jeffers, "Size and temperature dependence of surface plasmon absorption of gold nanoparticles induced by Tris(2,2'-bipyridine)ruthenium(II)", *J. Phys. Chem. B.* **108**, 15543-15551 (2004).

*24. S. Kyriacou, W. Brownlow, **X. Xu**[*], "Nanoparticle optics for direct observation of functions of antimicrobial agents in single live bacterial cells", *Biochemistry* **43**, 140-147 (2004).

*23. C. Steel, Q. Wan, **X. Xu**[*], "Single live cell imaging of chromosomes in chloramphenicol-induced filamentous *Pseudomonas aeruginosa*", *Biochemistry* **43**, 175-182 (2004).

22. **X. Xu**[*], R. Patel, "Nanoparticles for live cell dynamics", in *Encyclopedia of Nanoscience and Nanotechnology*, H. S. Nalwa, Ed., American Scientific Publishers, Vol. 7, 189-192, 2004 (**invited**).

*21. **X. Xu**[*], Q. Wan, S. Kyriacou, W. Brownlow, M. Nowak, "Direct observation of substrate induction of resistance mechanism in *Pseudomonas aeruginosa* using single live cell imaging", *Biochem. Biophys. Res. Commun.*, **305**, 941-949 (2003).

*20. **X. Xu**[*], W. Brownlow, S. Huang, J. Chen, "Real-time measurements of single membrane pump efficiency of single living *Pseudomonas aeruginosa* cells using fluorescence microscopy and spectroscopy", *Biochem. Biophys. Res. Commun*., **305**, 79-86 (2003).

*19. S. Kyriacou, M. Nowak, W. Brownlow, **X. Xu**[*], "Single live cell imaging for real-time monitoring of resistance mechanism in *Pseudomonas aeruginosa*", *J. Biomedical Optics*, **7**, 576 (2002)

*18. **X. Xu**[*], J. Chen, R. Jeffers, S. Kyriacou, "Direct measurement of sizes and dynamics of single living membrane transporters using nano-optics", *Nano Letters*, **2**, 175 (2002).

*17. **X. Xu**[*], R. Jeffers, J. Gao, "Novel solution-phase immunoassays for molecular analysis of tumor markers", *The Analyst*, **126**, 1285-1292 (2001) (**invited**).

*16. **X. Xu**[*], J. Gao, R. Jeffers, B. Logan, Z. Wen, "Molecular analysis of biomarkers for the earlier cancer detection", in *Scanning and Force Microscopies for Biomedical Applications II*, S. Nie, E. Tamiya and E. S. Yeung, Eds., *Proceedings of the SPIE*, **3922**, 15 (2000).

15. **X. Xu**[*], *J. Am. Chem. Soc*., **122**, 2144 (2000). Book Reviewer: "Modern Electrochemistry 1. Volume 1. Ionics", 2nd Ed. by J. O'M. Bockris.

*14. **X. Xu**, E. S. Yeung, "Long-range electrostatic trapping of single protein molecules at a liquid/solid interface", *Science*, **281**, 1650 (1998).

*13. **X. Xu**, E. S. Yeung, "Direct measurement of single-molecule diffusion and photodecomposition in free solution", *Science*, **275**, 1106 (1997).

*12. **X. Xu**, K. Shreder, B. Iverson, A. J. Bard, "Generation by electron transfer of an emitting state not observed by photoexcitation in a linked $Ru(bpy)_3^{2+}$-methyl viologen", *J. Am. Chem. Soc*., **118**, 3656 (1996).

*11. **X. Xu**, A. J. Bard, "Immobilization and hybridization of ss-DNA on an aluminum (III) alkanebisphosphonate thin film with electrogenerated chemiluminescent detection", *J. Am. Chem. Soc*., **117**, 2627 (1995).

*10. **X. Xu**, H. Yang, T. Mallouk, A. J. Bard, "Immobilization of DNA on an aluminum (III) alkanebisphosphonate thin film with electrogenerated chemiluminescent detection", *J. Am. Chem. Soc*., **116**, 8386 (1994) (JACS communication).

*9. **X. Xu**, A. J. Bard, "Electrogenerated chemiluminescence. 55. emission from adsorbed $Ru(bpy)_3^{2+}$ on graphite, platinum, and gold", *Langmuir*, **10**, 2409 (1994).

8. **X. Xu** (mentor: C. L. Hussey), "The electrochemistry of metals in room-temperature chloroaluminate molten salts", Dissertation. The University of Mississippi, Oxford, MS (1992).

*7. **X. Xu**, C. L. Hussey, "The electrochemistry of mercury at glassy carbon and tungsten electrodes in the aluminum chloride-1-methyl-3-ethylimidazolium chloride molten salt", *Proc. of International Symposium on Molten Salt Chemistry & Technology*, (1993).

*6. **X. Xu**, C. L. Hussey, "The electrochemistry of tin from aluminum chloride-1-methyl-3-ethylimidazolium chloride molten salt", *J. Electrochem. Soc*., **140**, 618 (1993).

*5. **X. Xu**, C. L. Hussey, "The electrochemistry of mercury from aluminum chloride-1-methyl-3-ethylimidazolium chloride molten salt", *J. Electrochem. Soc*., **140**, 1226 (1993).

*4. **X. Xu**, C. L. Hussey, "Electrodeposition of silver on metallic and nonmetallic electrodes from the acidic aluminum chloride-1-methyl-3-ethylimidazolium chloride molten salt", *J. Electrochem. Soc.*, **139**, 1295 (1992).

*3. **X. Xu**, C. L. Hussey, "The electrochemistry of gold at glassy carbon in the basic aluminum chloride-1-methyl-3-ethylimidazolium chloride molten salt", *J. Electrochem. Soc.*, **139**, 3103 (1992).

*2. **X. Xu**, C. L. Hussey, "Electrodeposition of metals from room-temperature chloroaluminate molten salts", *Proc. of Electrochem. Soc.*, **16**, 445 (1992).

*1. C. L. Hussey, **X. Xu**, "Electrodissolution and electrodeposition of lead in an acidic room temperature chloroaluminate molten salt", *J. Electrochem. Soc*., **138**, 1886 (1991).

Selected Presentations (Paper Abstracts Published in Conference Proceedings)

Invited Presentations:

51. **X. Xu***, P. D. Nallathamby, T. Huang, Kerry J. Lee, Lauren M. Browning,"Photostable Nanophotonics Probes for Molecular Imaging in Real-time: from Single Living Cells to Single Embryos", Proceeding of FACSS 2009 (Louisville, KY, Oct. 2009) (**invited**).

50. **X. Xu***, T. Huang, P. D. Nallathamby, "Photostable single molecule nanoparticle optical biosensors for sensing and imaging of single protein molecules and their binding kinetics", Proceeding of 237th ACS National Meeting (Salt Lake City, UT, March, 2009) (**invited**).

49. **X. Xu*, "**Photostable single nanoparticle biosensors for molecular imaging of single living cells**",** Proceeding of National Nano Engineering Conference (Boston, Nov. 12-13, 2008) **(invited).**

48. **X. Xu***, "Design of biocompatible single nanoparticle optics for biomedical imaging", Proceeding of National Nano Engineering Conference (Boston, Nov. 14-15, 2007) (**invited**).

47. **X. Xu***, P. D. Nallathamby, T. Huang, K. Lee, "*In vivo* imaging using single nanoparticle photonics", Proceeding of SERMACS 2007 (SC, October 24-27, 2007) (**invited**).

46. **X. Xu***, T. Huang, P. D. Nallathamby, D. Gillet "Design of single nanoparticle optical sensors for imaging and characterization of single receptor molecules on single living cells", Proceeding of 234th ACS National Meeting (Boston, Aug. 19-23, 2007) (**invited**).

45. **X. Xu***, P. D. Nallathamby, T. Huang, Y. Song, J. Lowman, "Design of biocompatible nanoparticles for probing living cellular functions", 2007 NNIN Annual Meeting (U. of Michigan, May 2007) (**invited**).

44. **X. Xu***, P. D. Nallathamby, T. Huang, Y. Song, J. Lowman, V. Pravodelov, "Single nanoparticle assay for real-time molecular study of cellular function of single living cells", Proc. of the 2007 Pittsburgh Conference (Chicago, Feb 25-March 2) (**invited**).

43. **X. Xu***, D. Gillet, H. Elsayed-Ali, C. Osgood, R. Van Duyne, "NIRT (II): Design of biocompatible nanoparticles for probing living cellular functions and their potential environmental impacts", NSF NIRT Grantee Conference (NSF, Dec. 4-6, 2006) (**invited**).

42. **X. Xu***, P. D. Nallathamby, T. Huang, V. Pravodelov, H. Xu, W. Brownlow, "Design of single nanoparticle optics for molecular imaging single living cells", Proceeding of 232th ACS National Meeting (Physical Chemistry Division, San Francisco, Sept. 10-14, 2006) (**invited**).

41. W. Brownlow, S. Kyriacou, P. D. Nallathamby, V. Pravodelov, J. Viola, Y. Song, T. Huang, **X. Xu***, "Design of single nanoparticle optics for probing living cellular function: efflux pump machinery", Virginia Nanotech 2006 meeting (July 11-13, 2006, Newport News, VA) (**invited**)

40. **X. Xu***, D. Gillet, H. Elsayed-Ali, C. Osgood, R. Van Duyne, "NIRT (I): Design of biocompatible nanoparticles for probing living cellular functions and their potential environmental impacts", NSF NIRT Grantee Conference (NSF, Dec. 11-15, 2005) (**invited**).

39. **X. Xu***, "Development of single nanoparticle optics for single living cell imaging", Proc. of 13th NSF Workshop On Materials Chemistry & Nanoscience, Oct 28-31, 2005 (**invited**).

38. **X. Xu***, P. Nallathamby, R. Jeffers, "Single nanoparticle optics assay for sensing single protein molecules on single living cells", Proceeding of 230th ACS National Meeting (DC, Aug. 28-Sept. 1, 2005) (**invited**).

37. **X. Xu***, P. Nallathamby, W. Brownlow, S. Kyriacou, "Single nanoparticle optics for real-time imaging membrane transport of single living cells", Proceeding of 230th ACS National Meeting (DC, 08/28-09/1, 2005) (**invited**).

36. P. D. Nallathamby, M. Natarajan, **X. Xu***, "Real-time study of signal transduction pathways involving in bystander effects using single nanoparticle optics and single living cell imaging", Proceed of DOE Investigators Meeting (Hyatt Bethesda, April 25-27, 2005) (i**nvited**).

35. **X. Xu***, W. Browlow, C. Steel, "Single molecule detection of subcellular events in single live cells", Proceeding of SERMACS, 2003 (**invited**).

34. **X. Xu**[*], W. Brownlow, Q. Wan, "Real-time imaging of effects of electric fields on subcellular structures using nanoparticle optics and single live cell microscopy", 3rd ElectroMed Conference in San Antonio, TX. (06/2003) (**platform speaker**).

33. **X. Xu**[*], R. Jeffers, W. Brownlow, J. Viola, "Electrochemilumiescence study of HIV receptors and tumor markers" Proc. of the 224th ACS National Meeting, Boston (08/2002) **(invited)**.

32. **X. Xu**[*], W. Brownlow, Q. Wan, S. Kyriacou, J. Viola, C. Steel, "Real-time single molecule chemical microscopy for monitoring of single biomolecules", New Instrumentation for Space at JPL-Caltech, (06/2002) **(invited)**.

31. **X. Xu**[*], R. Jeffers, J. Chen, W. Brownlow, S. Kyriacou, "Exploring living interfaces using single-molecule detection", Proc. of the 2002 Federation of Analytical Chemistry and Spectroscopy Societies (FACSS) **(invited)**.

30. **X. Xu**[*], R. Jeffers, S. Huang, J. Chen, "Single-molecule studies of single living cells", Proc. of the 222nd ACS National Meeting, Chicago (08/2001) **(invited)**.

29. **X. Xu**[*], S. Huang, J. Chen, S. Kyriacou, R. Jeffers, "Single-molecule studies of membrane pump machinery", Proc. the International Society for Optical Engineering (Photonics West-SPIE)/BiOS 2002, (San Jose, CA) **(invited)**.

28. **X. Xu**[*], R. Jeffers, "Single molecule probes of single ligand-receptor interaction on living cell surfaces", Proc. the International Society for Optical Engineering (Photonics West-SPIE)/BiOS 2002, (San Jose, CA) **(invited)**.

27. **X. Xu**[*], R. Jeffers, S. Huang, M. Nowak, H. Yoneyama, "Single-molecule analysis in biomedical sciences", Proc. the International Society for Optical Engineering (Photonics West-SPIE)/BiOS 2001, (San Jose, CA) (**invited**).

26. **X. Xu**[*], Z. Wen, R. Jeffers, J. Gao, "Single-molecule induction of single-cell immune response", Proc. of the 2000 Pittsburgh Conference (**invited**).

25. **X. Xu**[*], R. Jeffers, H. Yoneyama, "Ultrasensitive analysis of protein-protein interactions", Proc. of the 2000 Federation of Analytical Chemistry and Spectroscopy Societies (FACSS), (**invited**).

24. **X. Xu**[*], R. Jeffers, J. Gao, H. Yoneyama, "Single-molecule dynamics and interactions", Proc. of the 2000 Federation of Analytical Chemistry and Spectroscopy Societies (FACSS), (**invited**).

23. **X. Xu**[*], J. Gao, R. Jeffers, B. Logan, Z. Wen, "Molecular analysis of biomarkers for the earlier cancer detection", Proc. the International Society for Optical Engineering (Photonics West-SPIE)/BiOS 2000, (**invited**).

22. **X. Xu**[*], Z. Wen, J. Gao, "Single-molecule assay of tumor markers in T-cell apoptosis", Proc. of the First NASA/NCI Workshop, Caltech (06/99) (**invited**).

21. **X. Xu**[*], J. Gao, Z. Wen, R. Jeffers, "Single-molecule analysis of ligand-receptor interactions", Proc. of After the Genome-V, (10/99) (**invited**).

20. **X. Xu**[*], J. Gao, Z. Wen, R. Jeffers, "Emerging applications of single-molecule analysis in biomedical sciences", Proc. of Single-Molecule Analysis & Applications, Boston (08/99) (**invited**).

19. **X. Xu**[*], Z. Wen, "Electrochemiluminescence study of HIV receptors", Proc. of the 1999 Federation of Analytical Chemistry and Spectroscopy Societies (FACSS) (**invited**).

18. **X. Xu**[*], J. Gao, "Dynamics of single neurotransmitter molecules", Proc. of the 1999 Federation of Analytical Chemistry and Spectroscopy Societies (FACSS) (**invited**).

17. E. S. Yeung, **X. Xu**, S. Kang, J. Zheng, "Alignment at a solid-liquid interface and its implications on the double layer", Proc. of the 222nd ACS National Meeting, Chicago. **(invited)**

16. E. S. Yeung, **X. Xu**, M. Shortreed, "Single-molecule spectroscopy", Proc. of the 1999 Pittsburgh Conference (**invited**).
15. **X. Xu**, E. S. Yeung, "Chemical monitoring of single neurotransmitter molecules using laser-induced native fluorescence microscopy", Proc. of the 1998 FACSS Conference, Austin, TX (**invited**).
14. E. S. Yeung, **X. Xu**, "Microscale separations: from single cells to single molecules", Proc. of the 1998 Pittsburgh Conference, New Orleans, LA (**invited**).
13. E. S. Yeung, **X. Xu**, "Single-molecule dynamics in solution: from chromatography to medical diagnostics", Proc. of the 1998 Pittsburgh Conference, (**invited**).
12. **X. Xu**, E. S. Yeung, "Real-time monitoring of single-molecule reactions in free solution", Proc. of the 1997 FACSS Conference, Providence, RI (**invited**).
11. **X. Xu**, E. S. Yeung, "Real-time monitoring of single-molecule reactions in aqueous solution", Proc. of the 213rd ACS National Meeting, San Francisco, CA (1997) (**invited**).
10. E. S. Yeung, **X. Xu**, "Direct measurement of single-molecule dynamics in free solution", Proc. of the 213rd ACS National Meeting, San Francisco, CA (1997) (**invited**).
9. E. S. Yeung, **X. Xu**, "Following the reaction of single molecules: implications on molecular conformations and microenvironments", Proc. of the 1996 Eastern Analytical Symposium, Somerset, NJ (**invited**).
8. **X. Xu**, E. S. Yeung, "Watching single-molecule behavior in aqueous solution by total internal reflection fluorescence microscopy", Proc. of the 1996 FACSS Conference.
7. E. S. Yeung, W. Tan, **X. Xu**, S. J. Lillard, "Chemical movies of single cells and single molecules", Proc. of the 1996 FACSS Conference, Kansas City, MO (**invited**).
6. E. S. Yeung, S. J. Lillard, W. Tong, **X. Xu**, "Analytical instrumentation in the fourth dimension", Proc. of the 212nd ACS National Meeting, Orlando, FL (1996) (**invited**).
5. **X. Xu**, A. J. Bard, "DNA biosensors with electrochemiluminescent detection", Proc. of the First Conference for Worldwide Young Chinese Chemists, Peking University, China (1995) (**invited**).
4. **X. Xu**, K. Shreder, B. Iverson, A. J. Bard, "Electrochemiluminescent investigation of antibody affinity", Proc. of 46th International Society of Electrochemistry, Xiamen, China (1995) (**invited**).
3. **X. Xu**, A. J. Bard, "Sensing DNA using electrochemiluminescence", Proc. of the 46th International Society of Electrochemistry, Xiamen, China (1995) (**invited**).
2. **X. Xu**, C. L. Hussey, "The electrochemistry of mercury at glassy carbon and tungsten electrodes in the aluminum chloride-1-methyl-3-ethylimidazolium chloride molten salt", Proc. of International Symposium on Molten Salt Chemistry & Technology, (1993) (**invited**)
1. **X. Xu**, C. L. Hussey, "Electrodeposition of metals from room-temperature chloroaluminate molten salts", Proc. of Eighth International Symposium on Molten Salts, (1992) (**invited**).

Contributed Presentations:

61. P. Nallathamby, Tao Huang, K. Lee, Lauren M. Browning, **X. Xu***, "Photostable Nanophotonic Probes and Biosensors for Molecular Imaging and Diagnosis", NIH-Workshop-SPIE'2009, Bethesda, MD ,Oct. 1-2, 2009.
60. P. Nallathamby, K. Lee, **X. Xu***, "Using single nanoparticle optics for the real-time imaging of *in vivo* transport kinetics", Proc. of Pittcon'2009, Chicago, March 8-12, 2009.
59. P. Nallathamby, T. Huang, **X. Xu***, "Development of single nanoparticle biosensors for imaging of single protein molecules on single living cells", Proc. of Pittcon'2009, Chicago, March 8-12, 2009.
58. P. Nallathamby, K. Lee, **X. Xu***, "Design of stable single nanoparticle photonics for *in vivo* imaging", Proc. of Pittcon'2009, Chicago, March 8-12, 2009.

57. K. Lee, P. Nallathamby, L. Browning, **X. Xu***, "Developing single nanoparticle optics and *in vivo* assays for real-time characterization of transport and biocompatibility of nanomaterials", Proceeding of 236th ACS National Meeting, Philadelphia, 2008.
56. L. Browning, K. Lee, T. Huang, P. Nallathamby, J. Lowman, **X. Xu***, "Developing photostable and biocompatible single nanoparticle probes for *in vivo* imaging of early development of zebrafish embryos", Proceeding of 236th ACS National Meeting, Philadelphia, 2008.
55. P. Nallathamby, T. Huang, **X. Xu***, "Design of stable and biocompatible nanoparticle probes for single molecule study of single living cells", Proc. of Pittcon'2007, Chicago, Feb 25-March 2, 2007.
54. K. Lee, P. Nallathamby, L. Browning, C. Osgood, **X. Xu***, "Study of biocompatible of nanomaterials *in vivo*", Proc. of Pittcon'2007, Chicago, Feb 25-March 2, 2007.
53. **X. Xu***, P. Nallathamby, V. Pravodelov, W. Brownlow, H. Xu, "Development of single nanoparticle optics for single living cell imaging", Proc. of Pittcon'2006, Orlando, FL, March 12-17, 2006.
52. **X. Xu***, P. Nallathamby, H. Xu, "Molecular analysis of cellular pathways and functions using single nanoparticle assay," Proc. of Pittcon'2006, Orlando, FL, March 12-17, 2006.
51. **X. Xu***, H. Xu, P. D. Nallathamby, W. Brownlow, "Real-time tuning membrane transport and subcellular structures of single living cell using electric fields", Proc. of Pittcon'2006, Orlando, FL, March 12-17, 2006.
50. **X. Xu***, P. Nallathamby, "Timing intracellular function of single living cells using nanosecond electric pulses", Symposium Record Abstracts, ElectroMed2005, Portland, OR, May 2005, p. 25.
49. M. Khalid, C. Q. Zhou*, A. Bassi, H. L. Gerber, C. C. Tseng, **X. Xu***, "Heat transfer analysis of cell culture in a microchannel-based nsPEF system", Symposium Record Abstracts, ElectroMed2005, Portland, OR, May 2005, p 4.
48. **X. Xu***, W. Brownlow, S. Kyriacou, "Real-time probing of membrane transport in living microbial cells using single nanoparticle optics and living cell imaging", Proc. of Pittcon'2005.
47. **X. Xu***, W. Brownlow, S. Kyriacou, "Single-molecule study of subcellular function in single living cells", Proc. of Pittcon'2005**.**
46. P. Nallathamby, **X. Xu***, "Study of single ligand-receptor interactions on single live cell using single nanoparticle optics assay", Proc. of Pittcon'2005.
45. **X. Xu***, Q. Wan, J. Kolb, K. H. Schoenbach, "Real-time monitoring of effects of electric fields on kinetics of membrane transport in single living cells", Proc. of 2004 Bioelectromagnetics Society (BEMS) Annual Meeting.
44. Q. Wan, **X. Xu***, J. Kolb, K. H. Schoenbach, "Real-time study of accumulation effects of electric fields upon membrane transport in single living cells", Proc. of 2004 Bioelectromagnetics Society (BEMS) Annual Meeting.
43. C. Steel, **X. Xu***, "Study of biocompatibility of silver nanoparticles in bulk phase and at the single-cell resolution", Proc. of the 2004 Pittsburgh Conference.
42. C. Steel, **X. Xu***, "Real-Time probing of bacterial communication and growth: single cells versus clusters", Proc. of the 2004 Pittsburgh Conference.
41. Q. Wan, **X. Xu***, "Real-time probing of the effect of high electric field on subcellular functions", Proc. of the 2004 Pittsburgh Conference.

40. **X. Xu**[*], Q. Wan, C. Steel, R. Jeffers, "Real-time study of effects of electric fields on binding of single ligand-receptor interaction on living cell surfaces**",** 3rd ElectroMed Conference in San Antonio, TX.

39. **X. Xu**[*], S. Kyriacou, W. Brownlow, "Real-time single-molecule study of efflux pump machinery of single living bacterial cells", Gordon Research Conferences in Multi-drug Efflux Systems, (March 7-12, 2003).

38. **X. Xu**[*], Q. Wan, C. Steel, "Single live cell imaging of growth and division of *Pseudomonas aeruginosa*", Gordon Research Conferences in Multi-drug Efflux Systems, March 7-12, 2003.

37. C. Steel, **X. Xu**[*], **"**Study of hyper-elongation of *Pseudomonas aeruginosa* in antibiotics using single live-cell imaging**",** Proc. of the 2003 Pittsburgh Conference**.**

36. Q. Wan, C. Steel, **X. Xu**[*]**,** "Single live cell imaging of chromosome replication of *Pseudomonas aeruginosa*", Proc. of the 2003 Pittsburgh Conference.

35. C. Steel, **X. Xu**[*], "Study of multidrug resistance in cancer cells using live cell imaging and nanoprobes"**,** Proc. of the 2003 Pittsburgh Conference.

34. Q. Wan, **X. Xu**[*], "*In vivo* study of the function of apoptotic peptide tBid and nBid using fluorescence resonance energy transfer (FRET)"**,** Proc. of the 2003 Pittsburgh Conference.

33. **X. Xu**[*], J. Chen, R. Jeffers, S. Huang, M. Nowak, "Single-molecule dynamics and interactions at living interface", Proc. of the 221st ACS National Meeting, San Diego (04/2001).

32. **X. Xu**[*], S. Huang, "Single-molecule biosensing and chemical microscopy", Proc. of the 2001 Pittsburgh Conference.

31. **X. Xu**[*], K. Salaita, S. Huang, R. Jeffers, "Study of gold nanoparticles", Proc. of the 2001 Pittsburgh Conference.

30. **X. Xu**[*], M. Nowak, S. Huang, H. Yoneyama, "Probing of multi-antibiotic efflux pump machinery using fluorescence spectroscopy and electrochemiluminescence", Proc. of the 2001 Pittsburgh Conference.

29. R. Jeffers, **X. Xu**[*], "Novel ultrasensitive solution-phase immunoassay of tumor markers in serum samples using electrochemiluminescence", Proc. of the 2001 Pittsburgh Conference.

28. R. Jeffers, **X. Xu**[*]**,** "Biomedical applications of nanoparticle probes", Proc. of the 2001 Pittsburgh Conference**.**

27. **X. Xu**[*], S. Huang, M. Nowak, R. Jeffers, "Single-molecule probing of biomechanics", Proc. of the 2001 Pittsburgh Conference

26. **X. Xu**[*], R. Jeffers, M. Nowak, J. Gao, H. Yoneyama, "Single-molecule analysis in biomedical sciences", Nanoscience and Nanotechnology: Shaping Biomedical Research, (NIH campus, 06/2000).

25. **X. Xu**[*], Z. Wen, "Molecular analysis of HIV receptors and neutralizing antibody using electrochemiluminescence", Proc. of the 2000 Pittsburgh Conference.

24. R. Jeffers, **X. Xu**[*], "A novel solution phase immunoassay of prostate specific antigen using electrochemiluminescence", Proc. of the 2000 Pittsburgh Conference.

23. R. Jeffers, **X. Xu**[*], "Nanoparticle probes for use in biomolecular sensing", Proc. of the 2000 Pittsburgh Conference.

22. J. Gao, **X. Xu**[*], "Real-time monitoring of single biomolecules using total internal reflection

fluorescence microscopy", Proc. of the 2000 Pittsburgh Conference.

21. **X. Xu**[*], Z. Wen, B. Logan, "Real-time sensing of HIV biomarkers at molecule level ", The Gordon Research Conferences on Bioanalytical Senors, Ventura, CA (01/1999).

20. **X. Xu**[*], Z. Wen, R. Jeffers, B. Logan, J. Gao, "Ultrasensitive analysis of biomolecules: from HIV/tumor biomarkers to single protein molecules", The Gordon Research Conferences on Analytical Chemistry, New England College, NH (Summer 1999).

19. Z. Wen, **X. Xu**[*], "Real-time sensing HIV biomarkers using electrochemiluminescence detection", Proc. of the 1999 Pittsburgh Conference.

18. **X. Xu**[*], Z. Wen, "Single-molecule monitoring of HIV proteins in T cell immune response", Proc. of the 1999 Pittsburgh Conference.

17. **X. Xu**[*], Z. Wen, "Single-molecule immunoassay of tumor markers", Proc. of the 1999 Pittsburgh Conference.

16. Z. Wen, **X. Xu**[*], "Ultrasensitive analysis of HIV receptors and neutralizing antibodies using electrochemiluminescence", Proc. of the 1999 Virginia Academy of Science.

15. Z. Wen, B. Logan, R. Jeffers, **X. Xu**[*], "Electrochemiluminescence study of the interaction of biomolecules", Proc. of the 1999 Virginia Academy of Science.

14. R. Jeffers, B. Logan, Z. Wen, **X. Xu**[*], "Determination of prostate specific antigen using nanoparticle probes", Proc. of the 1999 Virginia Academy of Science.

13. **X. Xu**[*], J. Gao, Z. Wen, "Real-time monitoring of single biomolecules using laser-induced native fluorescence microscopy", Proc. of the 1999 Virginia Academy of Science.

12. **X. Xu**, E. S. Yeung, "Real-time monitoring of single membrane protein molecules using laser-induced native fluorescence microscopy", The Gordon Research Conferences on Membrane Transporters, Tilton School, NH (Summer 1998).

11. **X. Xu**, E. S. Yeung, "Single-molecule imaging of chromatographic interactions and interfacial structures", Proc. of the 1998 EAS Conference, Somerset, NJ.

10. **X. Xu**, E. S. Yeung, "Chemical movies of single ion-exchange", The Gordon Research Conferences on Analytical Chemistry, New England College, NH (Summer 1997).

9. **X. Xu**, E. S. Yeung, "Real-time monitoring of single-protein retention and partition at the liquid/solid interfaces", Proc. of the 1998 Pittsburgh Conference, New Orleans, LA.

8. **X, Xu**, E. S. Yeung, "Direct observation of single-molecule events", Proc. of the 1997 Pittsburgh Conference, Atlanta, GA.

7. **X. Xu**, A. J. Bard, "Immobilization and hybridization of ss-DNA on electronically conductive surfaces", The Gordon Research Conferences: Biomolecular Recognition & Immobilization, Colby-Sawyer College, NH (Summer 1996).

6. **X. Xu**, A. J. Bard, "Electrochemiluminescent investigation of molecular recognition of monoclonal antibody with Ruthenium (II) chelates", The Gordon Research Conferences: Biomolecular Recognition & Immobilization, Colby-Sawyer College, NH (1996).

5. **X. Xu,** A. J. Bard, "Electrochemiluminescent investigation of DNA biosensor and antibody affinity", Proc. of the 1996 Pittsburgh Conference, Chicago, IL (1996).

4. **X. Xu**, A. J. Bard, "Immobilization and hybridization of DNA on an aluminum (iii) alkanebisphosphonate film with electrochemiluminescent detection", Proc. of the 210th ACS

National Meeting, (1995).

3. **X. Xu**, A. J. Bard, "Electrochemiluminescent investigation of antibody affinity", Proc. of the First Conference for Worldwide Young Chinese Chemists, Peking University, China (1995).

2. **X. Xu**, A. J. Bard, "Electrogenerated chemiluminescent emission from adsorbed layers of $Ru(bpy)_3^{2+}$ and $Ru(dp\text{-}bpy)_3^{2+}$ on a highly order pyrolytic graphite (HOPG)", Proc. of Southwest Regional Meeting of the ACS, Austin, TX (1993).

1. P. A. Barnard, **X. Xu**, C. L. Hussey, "Electrochemistry and spectroelectrochemistry of hexanuclear transition metal clusters in room temperature chloroaluminate molten salts", Proc. of the 42nd Southeast/46th Southwest Combined Regional Meeting of the ACS, New Orleans, LA (1990).

Selected Invited Seminars

48. **X. Xu***, "Design of Photostable Plasmonic Nanoparticle Probes and Biosensors for Molecular Imaging of Single Living Cells", Clemson University (2009) (**invited**)

47. **X. Xu***, "Design of Biocompatible Nanoparticles for Molecular Imaging of Single Living Cells and Embryos", Brown University (2009) (**invited**)

46. **X. Xu***, "Design of Photostable Nanoparticle Optics and Biosensors for Molecular Imaging of Single Living Cells", Virginia Commonwealth University (2009) (**invited**)

45. **X. Xu***, "New Frontiers in Nanoscience and Nanotechnology: Design of Biocompatible Single Nanoparticle Optics for Imaging Single Living Cells", Xiamen University, (2008) (**invited**)

44. **X. Xu***, "Design of Single Nanoparticle Biosensors for Real-time Imaging of Single Living Cells", University of Maryland at College Park (2007) (**invited**)

43. **X. Xu***, "Design of Single Nanoparticle Photonics and Sensors for Real-time Probing of Single Living Cells and Embryos", University of Washington, Seattle (2007) (**invited**)

42. **X. Xu***, "Design of Single Nanoparticle Optics for Molecular Imaging of Single Living Cells**",** Rensselaer Polytechnic Institute (2007) (**invited**)

41. **X. Xu***, "Design of Biocompatible Single Nanoparticle Optics for Imaging Single Living Cells", Rice University (2007) (**invited**)

40. **X. Xu***, "Design of Single Nanoparticle Photonics and Biosensors for Real-time Molecular Analysis of Single Living Cells", Iowa State University (2007) (**invited**)

39. **X. Xu***, "New Frontiers in Nanobiotechnology: Design of Biocompatible Nanoparticles for Real-Time Molecular Imaging of Single Living Cells", Hampton University (2007) (**invited**)

38. **X. Xu***, "Design of Biocompatible Single Nanoparticle Optics for Real-Time Molecular Imaging of Membrane Transport in Single Living Cells ", University of Illinois at Urbana-Champaign (2006) (**invited**)

37. **X. Xu***, "Design of Biocompatible Single Nanoparticle Optics for Real-time Molecular Imaging of Living Cellular Function", Northeastern University (2006) (**invited**)

36. **X. Xu***, "Design of single nanoparticle optics for probing living cellular function", National Institute of Aerospace (2006) (**invited**)

35. **X. Xu*,** "Design of Single Nanoparticle Optics for Probing Living Cellular Membrane Transport" Student-Selected Speaker, University of Illinois at Urbana-Champaign (2005) (**invited**)

34. **X. Xu***, "Frontiers in Nanoscience and Nanotechnology, NIRT Lecture Series-2005: Design of

Single Nanoparticle Optics for Probing Living Cellular Membrane Transport", 1st Annual Public Lecture of NIRT Program at ODU (2005)

33. **X. Xu***, "Novel NanoBiotechnology", Nanoscience and Nanotechnology Meeting, Sigma Xi (2004)
32. **X. Xu***, "Real-Time Study of Accumulation Effects of Electric Fields Upon Membrane Transport in Single Living Cells", Center for Bioelectrics, College of Engineering and Technology at ODU (2004) **(invited)**.
31. **X. Xu***, "Molecular Study of Multidrug Resistance Using Nanoparticle Optics and Live Cell Imaging", Inst. for Struct. Bio. & Drug Discovery at Virginia Commonwealth University (2003)
30. **X. Xu***, "Real-time Single Molecule Monitoring of Multidrug Extrusion Pump of Single Living Cells", Eastern Virginia Medical School (2002) **(invited)**.
29. **X. Xu***, "Real-time Molecular Study of Subcellular Response to RF", 1st MURI Meeting at Purdue University, (2002) **(invited)**
28. **X. Xu***, "Single-molecule Study of Single Living Cells", ODU Physics Colloquium, (2001)
27. **X. Xu***, "Single-molecule Detection in Single Live Cells", University of Pittsburgh, (2001)
26. **X. Xu***, "Single-molecule Dynamics at Living Interfaces", Univ. of Wisconsin at Madison,
25. **X. Xu***, "Real-time Imaging of Single Live Cells", Eastern Virginia Medical School (1999)
24. **X. Xu***, "Real-time Monitoring of Single Protein Molecules Using Laser-Induced Native Fluorescence", Distinguished Lecture Series at Tennessee State University, (1999) (**invited**).
23. **X. Xu***, "Real-time Monitoring of Biomolecules Using Ultrasensitive Detection Means", Old Dominion University, Norfolk, VA (1999) (**invited**).
22. **X. Xu**, "Real-time Monitoring of Single Molecule Dynamics in Free Solution", Duke University, Durham, NC (1998) (**invited**).
21. **X. Xu**, "Single Molecule Detection in Free Solution and Novel DNA Biosensing", Montana State University, Bozeman, MT (1998) (**invited**).
20. **X. Xu**, "Chemical Monitoring of Single-Molecule Dynamics in Free Solution and at Liquid/Solid Interfaces", Louisiana State University, Baton Rouge, LA (1998) (**invited**).
19. **X. Xu**, "Single Molecule Dynamics of DNA and Proteins in Free Solution", Ohio University, Athens, OH (1998) (**invited**).
18. **X. Xu**, "Real-time Monitoring of Single Molecules Dynamics in Free Solution", Florida International University, Miami, FL (1998) (**invited**).
17. **X. Xu**, "DNA Biosensors with Electrochemiluminescence Detection", Oklahoma State University, Stillwater, OK (1998) (**invited**).
16. **X. Xu**, "Real-time Monitoring of Single Molecules in Free Solution", Old Dominion University, Norfolk, VA (1998) (**invited**).
15. **X. Xu**, " Real-time Single Molecule Detection in Free Solution", SUNY, NY (1997) (**invited**).
14. **X. Xu**, "Chemical Movies of Single Molecules", Drexel University, Philadelphia (1997) (**invited**).
13. **X. Xu**, "Real-Time Monitoring of Single-Molecule Events in Free Solution", Iowa State University, Ames, IA (1997) (**invited**).
12. **X. Xu**, "Direct Observation of Distinctive Single-Molecule Motion and Lifetime in Aqueous Solution", The Midwestern University Analytical Chemistry Conference, Urbana-Champaign, IL

(1996) (**invited**).

11. **X. Xu**, "Advanced in Electrogenerated Chemiluminescence", The City University of New York, (1996) (**invited**).
10. **X. Xu**, "Novel DNA Biosensors with Electrogenerated Chemiluminescence Detection", Iowa State University, (1996) (**invited**).
9. **X. Xu**, "Ultrasensitive Sensing of DNA and Antibody Affinity Using Electrochemiluminescent Detection", Harvard Medical School, Genetic Department, (1996) (**invited**).
8. **X. Xu**, "Electrochemiluminescent Detection for DNA Biosensor and Antibody Affinity", The Johnson & Johnson Family of Companies, CA (1995) (**invited**).
7. **X. Xu**, "Novel DNA Biosensor with Electrochemiluminescent Detection", Ortho Diagnostic Systems, Inc., Johnson & Johnson, NJ (1995) (**invited**).
6. **X. Xu**, "Electrochemiluminescent Investigation of DNA Biosensors and Antibody Affinity", Boehringer Mannheim, CA (1995) (**invited**).
5. **X. Xu**, "Advanced in Electrogenerated Chemiluminescence", International Electrochemiluminescence Advisory Board Meeting, Austin (1995) (**invited**).
4. **X. Xu**, "Immobilization of DNA on an Aluminum (III) Alkanebisphosphonate Thin Film with Electrogenerated Chemiluminescent Detection", The University of Texas at Austin, (1994)
3. **X. Xu**, "Electrochemical and Electrogenerated Chemiluminescent Investigation of the Interaction of Metal Chelates with Antibodies", The University of Texas at Austin, (1994).
2. **X. Xu**, "Immobilization and Hybridization of ss-DNA on an Aluminum (III) Alkanebisphosphonate Thin Film with Electrogenerated Chemiluminescent Detection", The University of Texas at Austin, (1994).
1. **X. Xu**, "Frontier Research on the Development of LCEC System for the Determination of Biological Molecules", The University of Mississippi, (1990).

Department and University Committees:

- Graduate student committee in Chemistry and Biochemistry Department (1998-present): actively recruited graduate students.
- Biological Chemistry Track Director of an interdisciplinary Ph.D. program in Biomedical Sciences, and executive committee members of PhD program in Biomedical Sciences (2001-present): actively recruit excellent students and increase the enrollment of graduate students.
- Active member of a university committee for the development of the Micro & Nano Technology Research Initiative booklet in Spring 2008
- Technology committee in Chemistry and Biochemistry Department (1999-2004): actively promote the web site development and multi-media presentation.
- Faculty search committee in Chemistry and Biochemistry Department (2000-2002): help to recruit excellent new faculty members.
- Departmental library representative (1999-2000): actively promote the subscription of on-line journals.
- Departmental representative and organizer of Commonwealth of Virginia Campaign (2000): Our department exceeded the campaign goal and won the award from the college in 2000.

TEACHING

• Taught **15 different** graduate and undergraduate courses given below:

- Taught **10 different** graduate and undergraduate courses given below
  - Instrumental Analysis Laboratory (Chem 708), 1998-99.
    (**Designed all experiments and wrote entire lab manual for the course**, Chem 708/422)
  - Frontiers in Nanoscience and Nanotechnology (Chem/Bio/ECE 560/460) (new course; Spring 09)
  - Analytical Separation Methods (Chem 552) (**new course**), Fall 2000
  - Physical Biochemistry (Chem 775), Spring 2001
  - Advanced Techniques in Clinical Chemistry (Chem 732/832), Fall 2003-2004
  - Advanced Techniques in Biochemistry (Chem 762/862), Fall 2002-2008
  - Advanced Analytical Chemistry (Chem 701) (**new course**), Fall 2005
  - Advanced Analytical Chemistry (Chem 702) (**new course**), Spring 2009
  - Biomedical Sciences Laboratory (Chem 814-816), 1998-2008
  - Master Research (Chem 698) and Thesis (Chem 699), 1998-2007
  - Doctoral Research (Chem 898), 1998-2008
- Taught **5** undergraduate courses listed below:
  - Analytical Chemistry Lecture (Chem 321), Spring and Fall 2002, 2006, 2007
  - Analytical Chemistry Laboratory (Chem 322), 2000-2008
  - Instrumental Analysis Laboratory (Chem 422), 1998-99
  - Frontiers in Nanoscience and Nanotechnology (Chem/Bio/ECE 560/460) **(new course)**
  - College Chemistry (Chem 102-N), Spring 2001

- Active faculty member in an interdisciplinary Ph.D. program in Biomedical Sciences
- Director of graduates and undergraduates for their laboratory training and thesis research
- Chair of guidance committees of 12 Ph.D. students in Biological Chemistry
- Member of dissertation committee for students in the Department of Physics, Chemistry and Biochemistry.

Summary of Group Members Directed since 1998

Postdocs: Drs. Ardi Vahedi, Tao Huang, Y. Song, H. Xu, J. Gao, and J. Chen

Ph.D. Students in Biomedical Sciences (Biological Chemistry Track)

Prakash Nallathamby; Venkta Moturi; Kerry Lee; Feng Ding; Lauren Browning; Pavan Cherukuri; C. Steel, R. Patel, R. Jeffers, S. Huang

Master Student in Chemistry, Biochemistry and Biotech

Sophia Kyriacou (Graduated in May 2003); William Brownlow (Graduated in May 2006)
Tanvi Desai (MS in Biotech) (Graduated in July 2008)

Undergraduate Students	(BS in Chemistry and Biochemistry)
Class 2009	Jill Lowman;
Class 2007	Elizabeth S Dupont (outstanding graduate senior, BS in chemistry); Vassiliki Pravodelov (outstanding graduate senior, BS in biochemistry) Rodney K Reed;
Class 2004	Renee Baker; Joshua Viola; Juan P. Rodriguez
Class 2003	Chris Manno (BS in physics, work on his senior project in our lab)
Class 2001	Khalid Salaita
Class 2000	Michelle Nowak (outstanding graduate senior, BS in biochemistry) Brad Logan (BS in both chemistry and engineering)
Visiting Scholar:	Dr. Hiroshi Yoneyama (Tokai University, Japan) supported by a 6-month fellowship from Ministry of Health and Sciences of Japan (12/1999-06/2000)