

## X. Nancy Xu, Ph.D.

*Professor in Chemistry, Biochemistry, Biomedical Sciences & Biomedical Engineering*

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### **Highlights of Scientific Publications, Presentations and Activities:**

- 188 presentations at national and international conferences (89 invited, 2 keynotes & 1 platform)
- 73 invited seminars
- 1 invited chapter in *Encyclopedia of Nanoscience and Nanotechnology*
- 1 invited chapter in *Encyclopedia of Spectroscopy and Spectrometry*
- 1 invited chapter in *Handbook of Nanostructured Biomaterials and Their Applications in Nanobiotechnology*
- Organized/Chaired 36 symposia/sessions at AAAS National meeting (1); American Chemical Society (ACS) national meeting (7); FACSS (3); Pittcon (16); Photonic West (SPIE) (3); NSF Grantee meeting (1); Single Cell Analysis USA Congress (3).
- Expert grant reviewer/panelist for 15 national/international funding agencies: NIH, NSF, EPA, DoE, DoD, NAS, ACS, USCRDF, DGF- Germany, French National Research Agency (ANR), Israel Science Foundation, Swiss-NSF; National Science Centre-Poland; Integrated Grants in Singapore; HKRGC-Hong-Kong
- One book review in *JACS*
- Editor of a book for a Wiley Chemical Analysis Series (2007)
- Developed 4 new graduate courses and one undergraduate courses
- Taught 10 different graduate course and 8 different undergraduate courses
- Biological Chemistry Track Coordinator of PhD program in Biomedical Sciences (2001-2012)

### **Selected Honors and Awards:**

- 2020 AAAS (American Association for the Advancement of Science) Mentor Award<sup>1</sup>
- 2020 Reign On Faculty Recognition Award (Student Nominated Shining Star Award)
- 2019 Expert Panelist for 2019 NIH BRAIN Initiatives: *Chemogenetic Innovations in the Manipulation and Monitoring of Labeled Neurons Workshop (12/10/2019)*<sup>2,3</sup>
- 2019 ACS Division of Analytical Chemistry Roland F. Hirsch Award for Distinguished Service in the Advancement of Analytical Chemistry
- 2019-present: Member of Advisory Board for Frank Reidy Research Center for Bioelectrics

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<sup>1</sup> <https://www.aaas.org/news/professor-x-nancy-xu-receives-aaas-mentor-award>

<sup>2</sup> <https://videocast.nih.gov/summary.asp?live=34961&bhcp=1>

<sup>3</sup> <https://www.nimh.nih.gov/news/events/announcements/chemogenetic-innovations-in-the-manipulation-and-monitoring-of-labeled-neurons-workshop.shtml>

- 2018 President John Broderick Diversity Champion Award
- 2018 Provost certificate of excellence in promoting undergraduate research
- 2018 Shining Star Recognition from ODU Division of Student Engagement & Enrollment Services
- 2018 American Chemical Society (ACS) joint Board-Council Committee on Publications
- 2016 Member of Executive Committee and Alternative Councilor, ACS Analytical Chemistry Division (2016-2021) (Elected in 2015 & Re-elected in 2018)
- 2015: One of 16 Phase-I Finalists of Follow That Cell Challenge, NIH Common Fund (2015)
- 2015 Shining Star Recognition from ODU Division of Student Engagement & Enrollment Services
- 2014: One of 36 NSF BRAIN Initiative EAGER Awardees
- 2012 Provost certificate of excellence in promoting undergraduate research
- Reviewer/Jury of Spectrochemical Analysis Award of ACS Division of Analytical Chemistry
- 2011: Fellow of the American Association for the Advancement of Science (AAAS)
- 2011 ACS certificate of appreciation for valuable contribution and dedicated service in the peer-review of manuscripts subscribed to ACS journal
- 2011-2013: Certificate of appreciation for significant contributions, outstanding dedications and valuable service to ocean lakes high school mathematics and science academy (2011, 2012, 2013)
- 2010 Faculty Research Achievement Award (one faculty per year)
- 2009 Distinguished Research Award of College of Sciences
- 2008 NASA Nanotech Briefs Nano 50™ Innovator Award
- 2007 NASA Nanotech Briefs Nano 50™ Award in the Technology
- 2007 Student-selected Most Inspiring Faculty Member, College of Sciences, ODU
- 2005 Student-selected seminar speaker (one per year), University of Illinois at Urbana-Champaign
- 2005: Student-selected Most Inspiring Faculty Member, College of Sciences, ODU
- 2002: Student-selected Most Inspiring Faculty Member of ACS student local section, 2002
- 1989-1992: Scholarship of The University of Mississippi

### **Education:**

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

## **Professional Positions:**

**Professor: (Joint appointment)** Dept. of Electric & Computer Engineering (Biomedical Engineering), Old Dominion University, 2018-present

**Professor (with tenure):** Dept. of Chem. and Biochem. Old Dominion University, 2009-present

**Biological Chemistry Track Coordinator/Director** of Ph.D. program in Biomedical Sciences, 2001-2012

**Associate Professor (with tenure):** Dept. of Chem. and Biochem., Old Dominion University, 2004-2008

**Assistant Professor:** Dept. of Chem. and Biochem., Old Dominion University, 1998-2003

### **Initiated and established the following innovative research programs:**

- 1) New nano tools and materials (photostable single nanoparticle optical probes) for real-time imaging of single live cells
- 2) New nanosensing and imaging tools for real-time probing of single neuron-neuron communication *in vivo*
- 3) Single nanoparticle (NP) microscopy and spectroscopy for study of single NP optics and their applications
- 4) **Single Molecule Nanoparticle Optical Biosensors (SMNOBS) and Photostable Optical Nanoscopy (PHOTON)** for super-resolution optical imaging of single live cells and embryos
- 5) New tools for earlier cancer detection
- 6) Real-time study of membrane transport and multidrug resistance mechanisms of single live cells
- 7) *In vivo* assays for study of dependence of nanotoxicity upon physiochemical properties of nanomaterials
- 8) 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 new research projects:**

- 1) Developed novel detection configurations and approaches for single-molecule detection
- 2) Studied single-molecule dynamics and reactions in free solution in real time
- 3) Monitored single molecular interaction at liquid/solid interfaces in real time
- 4) Published 2 papers in *Science*

**Postdoctoral Fellow:** Dept. of Chem. and Biochem., University of Texas at Austin (1993-95)

Mentor: **Prof. Allen J. Bard**, Member of National Academy of Sciences

### **Initiated and developed the following new research projects:**

- 1) Developed and characterized organic thin-films for immobilization and sensing of DNA
- 2) Developed novel DNA biosensors with electrochemiluminescent (ECL) detection
- 3) Characterized DNA biosensors using QCM, ECL, FTIR, and surface techniques (EM/AFM)
- 4) Studied ECL emission of fluorescence quenching compounds 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**, Distinguished Professor & Fellow of Electrochemical Society

### **Initiated, Performed and established the following new research projects:**

- 1) Developed new methods for study of metal depositions 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 Notable Professional Activities & Services:**

### **Invited expert grant reviewer:**

### **Member of NIH Study Sections (62 study sections):**

- NIH Enabling Bioanalytical and Imaging Technologies (EBIT-IMST 90, 2012, 2016, 2017, 2018)
- NIH Pathway to Independence Award (ZGM1 TWD-B: K99/R00, 2017, 2019)
- NIH Special Emphasis Panel: NCI U01: Innovative Research in Cancer Nanotechnology (2016)
- NIH Special Emphasis Panel: Biomedical Research Shared Instrumentation (2016)
- NIH Special Emphasis Panel: NCI- ZCA1 TCRB-Q (M3) (2016)
- NIH Special Emphasis Panel: Bioengineering (2014-2016)
- NIH Special Emphasis Panel: Oncological Sciences (2013-2016)
- NIH Bioengineering Sciences & Technologies (BST)-Nanotechnology (2007-08, 2012-15)
- NIH Fellowship: Cell Biology, Developmental Biology and Bioengineering (2013-2014)
- NIH Instrumentation and Systems Development (2007, 2012, 2018)
- NIH Panelist on Interface of the Life and Physical Sciences (ZRG1-BST-M-50, 2011)
- NIH Panelist: Bioanalytical, Biochemistry and Biophysics (IMST-G10B, 2010)
- 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 Nanotoxicity (NIEHS) (2010)
- NIH Panelist on Super Fund (NIEHS) (2009)
- NIH Panelist on Biosensor Core (NIEHS) (2002)

### **NSF Grant Review Panelist (23 panels):**

- NSF Panelist on Science and Technology Centers
- NSF Panelist on Biosensors
- NSF Panelist on the Rule of Life

- NSF Panelist on Chemical Measurement & Imaging
- NSF Panelist on CAREER Award
- NSF Panelist on Nano/Bio Interfaces
- NSF Panelist on Biophotonics
- NSF Panelist on Nanotechnology
- NSF Panelist on Centers for Chemical Innovation (CCI)
- NSF Panelist on Major Research Instrumentation (MRI)
- NSF Panelist on Chemistry Research Instrumentation and Facilities (CRIF)
- NSF Chemical Measurement and Imaging (CMI)
- NSF Rules of Life research

**EPA Grant Review Panelist:**

EPA Panelist on Impacts of Nanomaterials on Human Health

**Invited expert grant mail-reviewer:**

- American Chemical Society (ACS)
- Department of Energy (DoE)
- French National Research Agency (ANR)
- German Research Foundation (DFG = NSF in US)
- Hong Kong Research Grants Council (HKRGC)
- Israel Science Foundation
- Maryland Technology Development Corporation;
- National Academy of Sciences (NAS)
- National Science Centre-Poland
- Integrated Grants in Singapore
- Swiss-NSF
- US Civilian Research and Development Foundation (US State Department)
- US Army Medical Research and Materiel Command (USAMRMC) (DoD)

**Invited textbook reviewer:**

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

**Invited conference program committee member:**

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

**Invited peer reviewer for Selected Scientific Journals:**

- *Journal of American Chemical Society*
- *Journal of Physical Chemistry*
- *ACS Nano*
- *Nano Letters*
- *Nanoscale*
- *Analytical Chemistry*
- *Biochemistry*
- *Bioconjugate Chemistry*
- *Chemical Research in Toxicology*
- *Environmental Science & Technology*
- *Journal of Proteome Research*
- *Journal of the Electrochemical Society*
- *The Analyst*
- *Nanotoxicity*
- *Nanomedicine*
- *Scientific Reports*
- *Applied Spectroscopy*
- *Spectroscopy*
- *Biotechnology Progress*
- *Journal of Quantum Electronics*
- *Encyclopedia of Analytical Chemistry*

### **Organized/Chaired Invited Symposia at National & International Conferences:**

- Organizer/chair: **X. Xu**, invited symposium: "Nanotechnology, Single Molecule & Single Cell Analysis in Biology and Medicine", 2020 Fall ACS National Meeting, San Francisco, CA (virtual)
- Organizer/chair: **X. Xu**, invited symposium: "Nanotechnology, Single Molecule & Single Cell Analysis in Biology and Medicine", 2020 Spring ACS National Meeting, Philadelphia, PA (virtual)
- Organizer/chair: **X. Xu**, invited symposium: "Nanotechnology & Single Cell Analysis in Biology and Medicine", 2019 Fall ACS National Meeting, San Diego, CA
- Organizer/chair: **X. Xu**, invited symposium: "Interdisciplinary Chemistry for New Frontiers in Biology and Medicine", 2019 Spring ACS National Meeting, Orlando, FL
- Organizer/chair: **X. Xu**, invited symposium: "Nanotechnology & Single Cell Analysis in Biology and Medicine, Next Frontier", 2018 ACS National Meeting, Boston, MA
- Organizer/chair: **X. Xu**, invited symposium: "Nanotechnology & Single Cell Analysis in Biology and Medicine", 2017 ACS National Meeting, Washington, DC
- Chair: **X. Xu**, invited symposium: "Keynote Addresses: Translation to Diagnostic and Therapeutic Applications", 3rd Annual Next Generation Sequencing & Clinical Diagnostics Congress & Single Cell Analysis USA Congress, Boston, MA, 2017

- Stream Chair: **X. Xu**, invited symposium: “Part-I: Translation to Diagnostic and Therapeutic Applications”, 3rd Annual Next Generation Sequencing & Clinical Diagnostics Congress & Single Cell Analysis USA Congress, Boston, MA, 2017
- Stream Chair: **X. Xu**, invited symposium: “Part-II: Translation to Diagnostic and Therapeutic Applications”, 3rd Annual Next Generation Sequencing & Clinical Diagnostics Congress & Single Cell Analysis USA Congress, Boston, MA, 2017
- Organizer/chair: **X. Xu**, invited symposium: "Impacts of Single Cell Analysis on Biology and Medicine", 2017 Pittcon, Chicago, IL
- Organizer/chair: **X. Xu**, invited symposium: "Impacts of Nanotechnology & Single Molecule Spectroscopy in Biology and Medicine", 2016 ACS National Meeting, Philadelphia, PA
- Chair/Panelist: **X. Xu**, invited symposium: “Nanobiotechnology”, NSF Nanoscale Science and Engineering Grantees Conference: Progress in Nanotechnology, NSF Headquarter, Arlington, VA (2015)
- Organizer/chair: **X. Xu**, invited symposium: “New Frontiers in Single Molecule Detection and Single Cell Analysis”, 2013 AAAS Annual Meeting, Boston, MA
- Organizer/chair: **X. Xu**, invited symposium: "New Frontiers in Single Molecule Detection and Single Cell Analysis", 2011 ACS National Meeting, Denver, Colorado.
- Organizer/chair: **X. Xu**, invited symposium: "New Frontiers in Single Molecule Detection and Single Cell Analysis", 2010 ACS National Meeting, Boston, MA
- Organizer/chair: **X. Xu**, invited symposium: “Bioanalytical Applications of Single Molecule Detection and Spectroscopy”, Pittcon' 2007, Chicago, IL.
- Organizer/chair: **X. Xu**, invited symposium: "New Frontiers in Ultrasensitive Analysis: nanobiotech, single molecule detection, and single cell analysis”, 230<sup>th</sup> ACS National Meeting, 2005, Washington DC.
- Organizer/chair: **X. Xu**, invited symposium: "Emerging Ultrasensitive Tools in Bioanalysis", The 2002 Photonics West, SPIE, San Jose, CA
- Organizer/chair: **X. Xu**, invited symposium: "Emerging New Tools for Biomedical Applications II", The 2002 Photonics West, SPIE, San Jose, CA
- Organizer/chair: **X. Xu**, invited symposium: "Emerging Ultrasensitive Technologies for Earlier Detection", The 2001 Photonics West, SPIE, San Jose, CA
- Organizer/chair: **X. Xu**, invited symposium: "Emerging Applications of Single Molecule Analysis in the 21st Century", Pittcon' 2000, New Orleans, LA.
- Organizer/chair: **X. Xu**, invited symposium: "Ultrasensitive Detection in Bioanalysis”, FACSS' 2000, Nashville, TN
- Organizer/chair: **X. Xu**, invited symposium: "Single-Molecule Detection for Biological Analysis", The 1999 FACSS & 45th ICASS, Vancouver, BC.
- Organizer/chair: **X. Xu**, invited symposium: "Novel Approaches for Ultrasensitive Bioanalysis", The 1999 FACSS & 45th ICASS, Vancouver, BC.

#### **Chaired Technical Sessions at Pittcon**

- Chair: **X. Xu**, "Characterization of Novel Nanomaterials with Biological and Biomedical Applications", Pittcon' 2019

- Chair: **X. Xu**, "Microscopy Techniques for Biomedical/Pharmaceutical Applications", Pittcon' 2015
- Chair: **X. Xu**, "Microfluidics: Monitoring and Multiple Analytes", Pittcon' 2014
- Chair: **X. Xu**, "Biosensors", Pittcon' 2013
- Chair: **X. Xu**, "Nanotechnology: Biotechnology", Pittcon' 2013
- Chair: **X. Xu**, "Microfluidic/Lab-on-a-Chip I-Bioanalytical", Pittcon' 2012
- Chair: **X. Xu**, "Preparation, Characterization, & Toxicity of Biological Nanomaterials", Pittcon' 2011
- Chair: **X. Xu**, "Fluorescence/Luminescence in Bioanalytical Applications", Pittcon' 2010
- Chair: **X. Xu**, "Imaging Cellular Function", Pittcon' 2009
- Chair: **X. Xu**, "Novel Luminescent Labels and Detection Strategies", Pittcon' 2006
- Chair: **X. Xu**, "Biomedical Analysis Using Various Spectroscopic Methods", Pittcon' 2005
- Chair: **X. Xu**, "Advances in Biomedical Sciences", Pittcon' 2004
- Chair: **X. Xu**, "Advances in Drug Discovery", Pittcon' 2004
- Chair: **X. Xu**, "Bioanalysis in Cells and Tissues", Pittcon' 2001

## **Grants Awarded: (\$10,418,264 funded federal grants so far)**

### **A. Current Active Awards: (\$1,334,673 federal grants)**

- NSF: [CBET 1450936; \$359,307; 09/2014-08/2021] (PI: Xu)  
BRAIN EAGER: New Tools for Real-Time Imaging of Molecular-Resolution Connectomics of Synapses
- NIH (R21 HL127580) [\$420,750; 09/01/2015-07/31/2021] (PI: Xu)  
Title: Photostable Multiplexing NanoAssays for Real-Time Study of Embryonic Stem Cells
- NIH (GM119116) [\$465,000 04/2016-4/2021] (PI: Xu; Co-PI: Chris Osgood)  
Title: New Photostable Nanoprobes for Real-time Imaging of Single Live Cells
- NIH (GM119116S) [\$89,616; 08/2017-4/2021] (PI: Xu)  
Title: Research Supplement to Promote Diversity in Health-Related Research

### **B. Selected Pending & Revised Applications: (\$4,301,250 pending federal grants)**

- NIH R21 [\$426,250, 04/2021-03/2023] (PI: Xu)  
Title: Multiplexing Quantitative Photostable Nanoscopy for Single Live Cell Imaging
- NIH R01 [ \$1,937,500, 04/2021-03/2026] (PI: Xu)  
Title: New Nano Tools for Spatiotemporal Probing of Multidrug ABC Transporters
- NIH R01 [\$1,937,500, 04/2021-03/2026] (PI: Xu)  
Title: New Tools for Study of Multidrug Resistance of *Pseudomonas aeruginosa*



### C. **Completed Awards: (\$9,128,091)**

- NSF (CBET 0507036; \$1,713,851; 06/01/2005-05/31/2018) (PI: Xu)  
NIRT: Design of Biocompatible Nanoparticles for Probing Living Cellular Functions and Their Potential Environmental Impacts
- NIH (R01 GM0764401; \$1,246,431; 05/2006-05/2014) (PI: Xu)  
Title: Nanoassay for Real-time Molecular Probing ABC Transporter
- NIH (3 R01 GM076440-01S1; \$84,910; 07/2006-05/2013) (PI: Xu)  
Title: GRA Supplement for Nanoassay for Real-time Molecular Probing ABC Transporter
- NIH (3R01GM076440-04S1; \$430,387; 10/2009-04/2012) (PI: Xu)  
Title: Nanoassay for Real-time Molecular Probing ABC Transporter (Competitive Revision, R01)
- NIH (R21: RR15057-01; \$214,500; 04/2000-03/2004) (PI: Xu)  
Title: Real-Time Single-Molecule Chemical Microscopy
- Department of Energy (DE-FG02-03ER63646; \$236,512; 2003-2006) (Co-PI: Xu)  
Title: Real-Time Molecular Study of Bystander Effect Using Live Cell Imaging and Nanoparticle Optics
- NSF (DMR 0420304: MRI: Equipment fund: \$119,000; 07/2004-06/2007) (Co-PI: Xu)  
Title: Acquisition of an Ultrahigh Vacuum Scanning Tunneling Microscope
- DoD: Air Force Office of Scientific Research (AFOSR #F49620-02-1-0320; Multidisciplinary University Research Initiative (MURI), \$5 million, 06/02-05/07) (Co-PI: Xu, 33% among 3 PIs at ODU);  
Title: MURI-02: Subcellular Responses to Narrowband and Wideband Radiofrequency Radiation  
This project was 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, and colleagues at EVMS, MIT, Washington Univ. School of Medicine, UT-Health Science Center in San Antonio, and Univ. of Wisconsin-Madison. **Old Dominion University is the leading institution of this project.** This grant contributed significantly to the founding of bioelectric center at ODU.
- Air Force Office of Scientific Research (AFOSR) Equipment award (\$12,000; 05/2003-09/2004) (Co-PI: Xu)
- Ministry of Health and Sciences of Japan (\$26,000, 12/1999-06/2000) (PI: Xu)  
Title: Single-Molecule Probing of Extrusion Pump Machinery
- ODU Summer Research Fellowship (\$6,500, 06/1999-08/1999) (PI: Xu)  
Title: Single-Molecule Detection for Earlier Disease Diagnosis

### **Office of Research Multidisciplinary SEED Fund**

- Research SEED Funding (\$38,000: 01/2015-12/2015) (PI: Xu)  
Title: Collaborative Research: Development of Super-resolution and Real-time Optical Nanoscopy for Biomedical Research

### **Director and Mentor of Undergraduate Fellowships:**

- ODU Honor College Undergraduate Research Program for Priscilla Prem, Spring 2016 (PI: Xu)  
Title: *In Vivo* Study of Effects of Nanoparticles on Embryonic Cardiovascular Development
- ODU Honor College Undergraduate Research Program for Alice Gabrielov, 2015 (PI: Xu)  
Title: Study of Neurotoxic Effects of Silver Nanoparticles on Brain Development
- ODU Honor College Undergraduate Research Program for Nicole Gonda, 2014 (PI: Xu)  
Title: Design of New Silver Nanoparticle Arrays
- ODU Honor College Undergraduate Research Program for Seth Warren, 2012 (PI: Xu)  
Title: Exploring Applications of Plasmonic Optical Properties of Single Silver Nanoparticles
- ODU Honor College Undergraduate Research Program for Kevin D. Kircheval, 2011 (PI: Xu)  
Title: Study of Nanomaterials for Design of High Efficiency Solar Cells
- ODU Honor College Undergraduate Research Program for Jill Lowman, 2008 (PI: Xu)  
Title: Biocompatibility Study of Ferromagnetic Nanoparticles *In Vitro*
- ODU Honor College Undergraduate Research Program for Jill Lowman, 2007 (PI: Xu)  
Title: Study of Monolayer Protected Gold Nanoparticles in Medium
- ODU Honor College Undergraduate Research Program for Vassiliki Pravodelov, 2006 (PI: Xu)  
Title: Study of Nanowires and its Surface Functioning
- ODU Honor College Undergraduate Research Program for Renee Baker, 2004 (PI: Xu)  
Title: Study of Interactions of Biomolecules with Nanoparticles
- ODU Honor College Undergraduate Research Program for Juan Rodriguez, 2002 (PI: Xu)  
Title: Synthesis and Characterization of Silver Nanoparticles
- ODU Honor College Undergraduate Research Program for Michelle Nowake, 2001 (PI: Xu)  
Title: Probing of Multi-antibiotic Efflux Pump Machinery Using Fluorescence Spectroscopy
- ODU Honor College Undergraduate Research Program for Khalid Salaita, 2000 (PI: Xu)  
Title: Study of Gold Nanoparticles

### **Selected Research Highlights & Features in National Media and Scientific Journals:**

- **2015:** Highlighted by NIH: *Follow That Cell Challenge*, “Photostable multiplexing nanoassays for real-time molecular imaging of single live cells”; <https://commonfund.nih.gov/singlecell/challenge#X.%20Nancy%20Xu>
- **2015:** Highlighted by NSF: NSF Brain Initiative, “*Spying on Synapse*” (Video Highlight);  
<https://www.youtube.com/watch?v=NLtCkZB-Qvc> (better quality) or  
[https://www.nsf.gov/discoveries/disc\\_videos.jsp?cntn\\_id=135837&media\\_id=80497&org=NSF](https://www.nsf.gov/discoveries/disc_videos.jsp?cntn_id=135837&media_id=80497&org=NSF)
- **2013:** Journal Front-Cover Highlight, “Silver nanoparticles induce developmental stage-specific

embryonic phenotypes in zebrafish”, Journal Front-Cover Highlight, *Nanoscale* 5 (23), 2013; <https://pubs.rsc.org/en/content/articlepdf/2013/nr/c3nr03210h>

- **2012:** Journal Front-Cover Highlight, “Far-field photostable optical nanoscopy (PHOTON) for real-time superresolution single-molecular imaging of signaling pathways of single live cells”, *Nanoscale* 4 (9), 2012; <https://pubs.rsc.org/en/content/articlepdf/2012/nr/c2nr11739h>
- **2012:** Journal Front-Cover Highlight, “High-throughput ultrasensitive characterization of chemical, structural and plasmonic properties of EBL-fabricated single silver nanoparticles”, *Nanoscale* 4, 2012; <https://pubs.rsc.org/en/Content/ArticleLanding/2012/NR/C1NR11368B#!divAbstract>
- **2011:** Featured by *Chemical & Engineering News (C&EN)*, “Super-resolution Optical Imaging of Ligand-Protein Binding”, *C&EN*, P. 32, June 20, 2011.
- **2010:** Journal Back-Cover Highlight, “Study of cytotoxic and therapeutic effects of stable and purified silver nanoparticles on tumor cells”, *Nanoscale* 2 (6), 2010; <https://pubs.rsc.org/en/content/articlepdf/2010/nr/c0nr00080a>
- **2010:** Journal Back-Cover Highlight, “Synthesis and characterization of tunable rainbow colored silver nanoparticle solutions using single-nanoparticle plasmonic microscopy and spectroscopy”, *J. Material Chemistry* 20 (44), 2010; <https://pubs.rsc.org/en/content/articlepdf/2010/jm/c0jm01990a>
- **2007:** Featured by *C&EN*, “Silver Nanoparticles Monitored *in Vivo*”, *C&EN*, P. 36, Oct. 15, 2007
- **2007:** Featured by *Nanowerk Spotlight*, “First of a Kind Real-time Study of Nanosilver in Fish Embryos Raises Hopes and Concerns”, *Nanowerk*, Oct. 24, 2007
- **2007:** Cover Featured by *QUEST*, “Lighting Up the Inside of Cells”, *QUEST*, Vol. 10, June, 2007
- **2006:** Featured by *National Cancer Institute (NCI)*, “Mission to the Inside of a Living Cell”, *National Cancer Institute (NCI) Alliance for Nanotechnology in Cancer*, Monthly Feature, May, 2006; <http://ww2.odu.edu/~xhXu/NCI2006May.pdf>
- **2006:** Featured by the Front Page of *The Virginian-Pilot*, “ODU Professor a Big Fish in A Teensy Pond”, July 7, 2006; [https://www.pilotonline.com/news/education/article\\_a9a99de5-5fac-5437-be17-d49ec359181f.html](https://www.pilotonline.com/news/education/article_a9a99de5-5fac-5437-be17-d49ec359181f.html)
- **2006:** Featured by *Richmond Times-Dispatch*, “Nanotechnology at ODU”, July 13, 2006
- **2003:** Highlighted by *Biophotonics*, “New Technique Shows Mechanism for Antibiotic Resistance”, *Biophotonics International*, January/February, 62-63, 2003
- **1998:** Highlighted by *Science*, “Trapping at Long Range”, *Science*, 281, 1569, 1998.
- **1998:** Highlighted by *Anal. Chem.*, “Electrostatic Trapping Causes Retention”, *Anal. Chem.*, 70, 703A, 1998
- **1997:** Featured by *C&EN*, “Imaging Single Molecules in Motion”, *C&EN*, p.10, Feb. 24, 1997
- **1997:** Highlighted by *Science*, “Singling Out Molecules”, *Science*, 275, 1041, 1997
- **1997:** Highlighted by *Anal. Chem.*, “Continuous Single-Molecule Monitoring”, *Anal. Chem.*, 69, 223A, 1997

## **Patents & Patent Applications:**

- **X. Xu\***, L. Browning, “New Green Methods for Culture of Embryonic Stem Cells”. Provision US Patent App. 61/293,526.
- **X. Xu\***, T. Huang, P. Nallathamby, “Nanoparticle Biosensors”, US Patent App. 12/232,184, filed in 2009 (Citation = 5)
- **X. Xu\***, P. Nallathamby, K. Lee, "Stable Nanoparticles, Nanoparticle-Based Imaging Systems, Nanoparticle-Based Assays, and *In Vivo* assays for Screening Biocompatibility and Toxicity of Nanoparticles”, US Patent App. 12/219,233, filed in 2012 (Citation = 14)
- **X. Xu\***, S. Kyriacou, R. Jeffers, "Metallic Nanoparticles for Inhibition of Bacterium Growth”, US Patent App. 10/484,485, filed in 2003 (Citation = 26)
- Allen J. Bard and **X. Xu**, "Biosensor for and Method of Electrogenerated Chemiluminescent Detection of Nucleic Acid Adsorbed to a Solid Surface", Australian Patent No.703344, Worldwide Patent. World Intellectual Property Organization No. WO9606946A1, issued 03/07/1996).

## **Selected Peer-Reviewed Publications:**

(Original Research peer-reviewed publications: Total citations = 4811; h-index = 34; i10-index = 51; citation number on 08/2020 is listed below; See <http://scholar.google.com/citations?user=4a4OTm0AAAAJ> for updated citations; listed Impact Factor on/near the year of publication.)

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67. P. Songkiatisak, Cherukui, **X. Xu\***, “Multicolored single plasmonics nanoparticles for real-time imaging efflux kinetics of single ABC multidrug membrane transporter in single live cells” *Anal. Bioanal. Chem.* (Springer Nature journal: IF = 3.286) (**Peer-reviewed Invited Series, Highlights: Top Experts**, to be submitted)
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2. **X. Xu**, C. L. Hussey, "Electrodeposition of metals from room-temperature chloroaluminate molten salts", *Proc. of Electrochem. Soc.*, **16**, 445 (1992). (ECS Journal: IF = 3.662; Citation = 8); <http://ecst.ecsdl.org/content/ecstpv/1992-16/445.full.pdf+html>
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). (ECS Journal: IF = 3.662; Citation = 64); <http://jes.ecsdl.org/content/138/7/1886.full.pdf+html>

## **Selected Invited & Contributed Presentations & Published Abstracts (87 invited, 2 keynotes, 1 Platform)**

188. **X. Xu\***, P. Songkiatisak, P. Cherukuri, “Photostable nano probes for single molecule sensing and imaging of single live cells”, 260th ACS National Meeting 2020, San Francisco, CA (**invited**).
187. **X. Xu\***, “Spectroscopic tracking of single plasmonic nanoparticles for probing nano-environments of developing embryos”, 260th ACS National Meeting 2020, San Francisco, CA (**invited**).
186. **X. Xu\***, P. Songkiatisak, P. Cherukuri, K. Raut, R. Richardson, “Single nanoparticle plasmonic spectroscopy for biomedical applications: from diagnosis to therapy”, 258th ACS National Meeting 2019, San Diego, CA (**invited**).
185. **X. Xu\***, “New Nano Tools for Real-time Single Molecule Imaging of Single Live Cells: From Fundamental Discoveries to biomedical Applications”, 258th ACS National Meeting 2019, San Diego, CA (**invited Award Address**).
184. R. Richardson, K. Raut, T. Zvonareva, P. Songkiatisak, P. Cherukuri, **X. Xu\***, “Study of cytotoxic and therapeutic effects of silver nanoparticles against colon tumor cells”, 258th ACS National Meeting 2019, San Diego, CA.
183. **X. Xu\***, R. Richardson, K. Raut, P. Songkiatisak, P. Cherukuri, “Real-time probing of cytotoxic and therapeutic effects of single nanoparticles on single tumor cells”, 257th ACS National Meeting 2019, Orlando, FL (**invited**).
182. **X. Xu\***, P. Songkiatisak, P. Cherukuri, F. Ding, “Single nanoparticle spectroscopic imaging for probing of multidrug membrane transporters of single live cells”, Pittcon 2019, Philadelphia, PA.
181. **X. Xu\***, P. Songkiatisak, P. Cherukuri, K. Raut, “Single Nanoparticle Optical Biosensors for Real-time, Single-Molecule and Super-Resolution Imaging of Single Live Cells”, Pittcon 2019, Philadelphia, PA.
180. **X. Xu\***, P. Songkiatisak, P. Cherukuri, “Photostable optical nanoscopy (PHOTON) for cancer research”, 256th ACS National Meeting 2018, Boston, MA (**invited**).
179. **X. Xu\***, P. Songkiatisak, P. Cherukuri, F. Ding, T. Huang, “Multifunctional size-dependent drug nanocarriers for probing multidrug membrane transporters of single live cells”, 256th ACS National Meeting 2018, Boston, MA (**invited**).
178. **X. Xu\***, M Johnson, P. Cherukuri, P. Songkiatisak, K. Raut, “BRAIN-EAGER: New tools for real-time *in vivo* imaging of single neuron-neuron communication during embryonic development”, 4<sup>th</sup> BRAIN Initiative Investigators Meeting 2018, Baltimore, MD (**invited**).
177. **X. Xu\***, M. Johnson, P. Cherukuri, P. Songkiatisak, “Photostable nanosensors for real-time and single molecular imaging and tracking of neurotransmitters *in situ*”, Neuroscience 2017, Washington DC.

176. **X. Xu\***, “New nano tools for real-time single-molecular sensing and imaging of single live cells”, 3<sup>rd</sup> Annual Next Generation Sequencing & Clinical Diagnostics Congress & Single Cell Analysis USA Congress, 2017, Boston (**invited**).
175. **X. Xu\***, P. Songkiatisak, P. Cherukuri, “Photostable optical nanoscopy (PHOTON) for following single live cells: From fundamental discoveries to biomedical applications”, 254th ACS National Meeting 2017, Washington DC (**invited**).
174. P. Songkiatisak, P. Cherukuri, S. Phan, **X. Xu\***, “Probing of effects of silver nanoparticles on single liver tumor cells”, 254th ACS National Meeting 2017, Washington DC.
173. P. Songkiatisak, P. Cherukuri, **X. Xu\***, “Real-time imaging and sensing of single cancer stem cells”, 254th ACS National Meeting 2017, Washington DC.
172. M. Johnson, **X. Xu\***, “Real-time *in vivo* monitoring of single neuron-neuron communication”, 254th ACS National Meeting 2017, Washington DC (**invited**).
171. **X. Xu\***, “Photostable multiplexing nanoassays for real-time molecular imaging of single live cells”, 4th Annual Single Cell Analysis Investigator Meeting, NIH Campus, Bethesda, MD, 2017 (**invited**).
170. **X. Xu\***, P. Cherukuri, P. Songkiatisak, S. Phan, “New nano tools for real-time imaging of single cancer stem cells”, Pittcon’2017, Chicago, IL (**invited**).
169. **X. Xu\***, “BRAIN EAGER: New tools for real-time imaging of synapses”, 3<sup>rd</sup> BRAIN Initiative Investigators Meeting, Baltimore, MD (2016) (**invited**).
168. **X. Xu\***, K. Lee, T. Huang, F. Ding, P. Cherukuri, “Single nanoparticle plasmonic spectroscopy for single-molecule sensing and super-resolution imaging of single live cells”, FACSS & SCIX 2016, Minneapolis, MN (**invited**).
167. **X. Xu\***, P. Cherukuri, P. Songkiatisak, T. Huang “Photostable optical nanoscopy (PHOTON) for dynamic and single molecule imaging of single live cells: from diagnosis to therapy”, 252<sup>nd</sup> ACS National Meeting 2016, Philadelphia, PA (**invited**).
166. **X. Xu\***, Cherukuri, P. Songkiatisak, T. Huang, “New photostable nano tools for following that single live cells”, 4th Annual Single Cell Analysis Investigator Meeting, NIH Campus, Bethesda, MD, 2016 (**invited**).
165. **X. Xu\***, P. Cherukuri, P. Songkiatisak, “New nano tools for molecular sensing and imaging of single neuron-neuron communication”, Pittcon’2016, Atlanta, GA (**invited**).
164. **X. Xu\***, K. Lee, T. Huang, P. Songkiatisak, F. Ding, “Single nanoparticle plasmonic spectroscopy and biosensors for imaging of efflux functions of single live cells”, Pittcon’2016, Atlanta, GA.
163. **X. Xu\***, “BRAIN EAGER: New tools for real-time and molecular imaging of synapses”, Joint NSF/NIH BRAIN Initiative Investigators Meeting, Baltimore, MD (2015) (**invited**).

162. **X. Xu\***, “New nano tools for real-time and single molecular imaging of single live cells”, NSF Nanoscale Science and Engineering Grantees Conference: Progress in Nanotechnology, Arlington, VA (2015) (**invited**).
161. **X. Xu\***, T. Huang, P. Cherukuri, P. Songkiatisak, “New nano tools for “follow-that-molecule” in single live cells”, Eastern Analytical Symposium, NJ (2015) (**invited**).
160. **X. Xu\***, “New tools for real-time imaging of single live cells”, Mayo Brain Initiative Symposium (2015) (**invited**). (The presentation webcasts throughout all Mayo clinic locations.)
159. **X. Xu\***, “Photostable multiplexing nanoassays for real-time molecular imaging of single live cells”, 3<sup>rd</sup> Annual Single Cell Analysis Investigator Meeting, NIH Campus, Bethesda, MD, 2015 (**invited**).
158. **X. Xu\***, T. Huang, K. Lee, P. Nallathamby, “Super-resolution optical imaging of real-time membrane transport of single live cells”, Pittcon’2015, New Orleans (**invited**).
157. **X. Xu\***, P. Cherukuri, P. Songkiatisak, S. Warren, T. Huang, “PHOTON for real-time sensing and imaging of rare-subsets of single cancer stem cells in heterogeneous tumor cells”, 250<sup>th</sup> ACS Meeting 2015, Boston.
156. **X. Xu\***, F. Ding, P. Songkiatisak, P. Cherukuri, T. Huang, “Study of size and dose dependent therapeutic effects of nano drug carriers”, Pittcon’2015, New Orleans, LA.
155. P. Songkiatisak, M. Johnson, L. Browning, P. Cherukuri, S. Warren, N. Gonda, **X. Xu\***, “Acute nano toxicity study of effect of nanoparticles on embryonic development”, Pittcon’2015, New Orleans, LA.
154. M. Johnson, P. Songkiatisak, P. Cherukuri, S. Warren, N. Gonda, L. Browning, **X. Xu\***, “*In vivo* study of nanoparticles on embryonic neurological development”, Pittcon’2015, New Orleans, LA.
153. **X. Xu\***, “BRAIN EAGER: New tools for real-time imaging of molecular-resolution connectomics of synapses”, Joint NSF/NIH BRAIN Initiative Investigators Kick-Off Meeting (2014) (**invited**).
152. T. Huang, P. Nallathamby, L. Browning, K. Lee, **X. Xu\***, “New nanophotonics tools for real-time and single molecule imaging of single live cells”, NeuroConnections 2014, ODU, Norfolk, VA
151. **X. Xu\***, K. Lee, L. Browning, P. Nallathamby, “Making silver nanoparticles biocompatible”, Pittcon’2014, Chicago.
150. L. Browning, K. Lee, P. Nallathamby, P. Cherukuri, E. Perez, **X. Xu\***, “Study of charge-dependent efflux function of multidrug membrane transporters in single live cells”, Pittcon’2014, Chicago.
149. **X. Xu\***, K. Lee, T. Huang, F. Ding, and P. Nallathamby, “PHOTON for super-resolution imaging of efflux functions of single membrane transporters in single live cells”, Pittcon’2014, Chicago.

148. **X. Xu\***, L. Browning, K. Lee, P. Nallathamby, “Ultrasensitive assays for study of nanotoxicity and nanomedicine”, Pittcon’2014, Chicago.
147. L. Browning, F. Ding, T. Huang, **X. Xu\***, “Design of new methods for study of embryonic stem cells”, Pittcon’2014, Chicago.
146. M. Johnson, P. Songkiatisak, L. Browning, **X. Xu\***, “*In vivo* toxicology study of ions on embryonic development”, Pittcon’2014, Chicago.
145. P. Songkiatisak, M. Johnson, L. Browning, **X. Xu\*** “Design of *in vivo* assays for the study of toxicity of silver cations”, Pittcon’2014, Chicago.
144. **X. Xu\***, K. Lee, L. Browning, P. Nallathamby, “Single nanoparticle spectroscopy and ultrasensitive *in-vivo* assays for real-time study of nanotoxicity”, The 15<sup>th</sup> Beijing Conference and Exhibition on Instrumental Analysis (BCEIA) (Beijing, China, 2013) (**Invited keynote**).
143. **X. Xu\***, “Single plasmonic nanoparticle biosensors for single-molecule and super-resolution imaging of single live cells”, Biosensing and Nanomedicine-III (2013 Optics + Photonics, SPIE, San Diego, 08/2013) (**invited**).
142. **X. Xu\***, “Single nanoparticle optical biosensors”, Symposium on Frontiers of Nano & Bioanalytical Chemistry (St. John’s University, NYC, 03/2013) (**invited keynote**).
141. **X. Xu\***, “Nanoparticle biosensors for mapping single-molecule functions in single live cells”, American Association for the Advancement of Science (AAAS) Annual Meeting (Boston, 02/2013) (**invited**).
140. **X. Xu\***, T. Huang and L. Browning. “Far-field photostable optical nanoscopy (PHOTON) for super-resolution imaging of single protein-ligand binding complexes”, Far-field Super Resolution Microscopy I (2013 Optics + Photonics, SPIE, San Diego, 08/2013).
139. **X. Xu\***, T. Huang, L. M. Browning, “Far-field photostable optical nanoscopy (PHOTON) for super-resolution and single-molecule imaging of single live cells”, Pittcon’2013, Philadelphia, PA.
138. **X. Xu\***, K. Lee, L. Browning, P. Nallathamby, P. K. Cherukuri, “Single nanoparticle spectroscopy for quantitative analysis of nanotoxicity”, Pittcon’2013, Philadelphia, PA.
137. **X. Xu\***, T. Huang, L. M. Browning, “Multiplexing analysis of single protein molecules using single-molecule nanoparticle optical biosensors (SMNOBS)”, Pittcon’2013, Philadelphia, PA.
136. **X. Xu\***, Z. Wen, W. Brownlow, “Electrochemiluminescence assay for ultrasensitive analysis of HIV receptor and neutralizing antibody”, Pittcon’2013, Philadelphia, PA.
135. **X. Xu\***, “Single molecule nanoparticle optical biosensors (SMNOBS) for super-resolution imaging of single live cells”, Gordon Research Conference on Analytical Biosensors (Newport, RI, 06/2012) (**invited**).

134. T. Huang, L. M. Browning, **X. Xu\***, “Design of far-field photostable optical nanoscopy for real-time super-resolution single-molecule imaging of single live cells”, Pittcon’2012, Orlando, FL.
133. T. Huang, L. M. Browning, **X. Xu\***, “Single-molecule nanoparticle optical biosensors for super-resolution imaging of single protein-ligand binding complexes”, Pittcon’2012, Orlando, FL.
132. **X. Xu\***, T. Huang, L. Browning, P. Nallathamby, “Plasmonic nanoparticle probes for study of single ABC multidrug membrane transporters of single live cells”, 242<sup>nd</sup> ACS National Meeting 2011, Denver (**invited**).
131. **X. Xu\***, T. Huang, L. Browning, P. Nallathamby, “Photostable single molecule nanoparticle biosensors for real-time imaging of single living cells”, 242<sup>nd</sup> ACS National Meeting 2011, Denver, CO (**invited**).
130. **X. Xu\***, “Nanoassay for real-time molecular probing of multidrug membrane transporters”, Gordon Research Conference on Multidrug Efflux Systems 2011 (Les Diablerets, Switzerland, June 2011) (**invited**).
129. **X. Xu\***, “Photostable plasmonic nano rulers and single-molecule biosensors: from single cells to single embryos”, 2011 International Workshop in Chemical Biology, Xiamen, 2011 (**invited**).
128. **X. Xu\***, T. Huang, “Super-resolution and single molecule imaging of SERS hot spots”, The 242<sup>nd</sup> ACS National Meeting 2011, Denver, CO.
127. **X. Xu\***, K. J. Lee, L. M. Browning, P. D. Nallathamby, “Design of *in vivo* assays for probing of physicochemical dependent biocompatibility and toxicity of nanomaterials”, The 242<sup>nd</sup> ACS National Meeting 2011, Denver, CO.
126. **X. Xu\***, P. Nallathamby, T. Huang, “Design of optical nano rulers for sizing of single nanoparticles using optical microscopy and spectroscopy”, Pittcon/ACS 2011, Atlanta, GA.
125. **X. Xu\***, P. Nallathamby, “Cytotoxic and therapeutic effects of stable and purified silver nanoparticles on tumor cells”, Pittcon’2011, Atlanta, GA.
124. **X. Xu\***, K. Lee, P. Nallathamby, “Design of size-dependent plasmonic nanoparticles for probing of multidrug membrane transporter of single live cells in real time”, Pittcon/ACS 2011, Atlanta, GA.
123. K. Lee, P. Nallathamby, L. Browning, **X. Xu\***, “*In-vivo* study of size-dependent transport and biocompatibility of single silver nanoparticles”, Pittcon’2011, Atlanta, GA.
122. K. Lee, L. Browning, T. Huang, P. Nallathamby, **X. Xu\***, “Design of single plasmonic nanoparticle optical probes for study of multidrug ABC membrane transporter in single living cells”, Pittcon’2011, Atlanta, GA.
121. **X. Xu\***, P. Nallathamby, T. Huang, K. Lee, L. Browning, “Design of multifunctional nanoparticle probes for molecular imaging and sensing in single living organisms”, The Federation of

Analytical Chemistry and Spectroscopy Societies (FACSS) 2010 (Raleigh, NC, Oct. 2010) (**invited**).

120. **X. Xu\***, T. Huang, M. Browning, P. Nallathamby, “Design of photostable single molecule nanoparticle biosensors for real time probing of single live cells”, 204<sup>th</sup> ACS National Meeting (Boston, 08/2010) (**invited**).
119. **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”, The 204<sup>th</sup> ACS National Meeting 2010 (Boston).
118. L. Browning, K. Lee, T. Huang, P. Nallathamby, J. Lowman, **X. Xu\***, “Real-time imaging of transport and diffusion of single gold nanoparticles *in vivo*”, Pittcon’2010, Orlando, FL.
117. L. Browning, K. Lee, T. Huang, P. Nallathamby, J. Lowman, **X. Xu\***, “Developing *in vivo* assays for probing biocompatibility of single gold nanoparticles”, Pittcon’2010, Orlando, FL.
116. K. Lee, L. Browning, T. Huang, P. Nallathamby, **X. Xu\***, “Real-time probing of efflux mechanisms of single living cells using photostable single nanoparticle optics”, Pittcon’2010, Orlando, FL.
115. K. Lee, T. Desai, P. Nallathamby, L. Browning, **X. Xu\***, “*In vivo* study of size dependent transport and biocompatibility of single silver nanoparticles in zebrafish embryos in real-time”, Pittcon’2010, Orlando, FL.
114. T. Huang, P. Nallathamby, **X. Xu\***, “Single molecule detection and sensing of individual receptor molecules on single living cells using single nanoparticle plasmonic optical biosensors”, Pittcon’2010, Orlando, FL.
113. T. Huang, P. Nallathamby, **X. Xu\***, “Real-time sensing and detection of single cytokine molecules using photostable single-molecule nanoparticle optical biosensors”, Pittcon’2010, Orlando, FL.
112. **X. Xu\***, P. Nallathamby, T. Huang, K. Lee, L. Browning, “Photostable nanophotonics probes for real-time molecular imaging: from single living cells to single embryos”, FACSS 2009 (Louisville, KY, 10/2009) (**invited**).
111. **X. Xu\***, T. Huang, P. Nallathamby, “Photostable single molecule nanoparticle optical biosensors for real-time sensing and imaging of single protein molecules and their binding kinetics”, 237<sup>th</sup> ACS National Meeting (Salt Lake City, 03/2009) (**invited**).
110. P. Nallathamby, T. Huang, K. Lee, L. Browning, **X. Xu\***, “Photostable nanophotonic probes and biosensors for molecular imaging and diagnosis”, NIH-Workshop-SPIE’2009, Bethesda, MD (Oct. 1-2, 2009)
109. P. Nallathamby, K. Lee, **X. Xu\***, “Using single nanoparticle optics for real-time imaging of *in vivo* transport kinetics”, Pittcon’2009, Chicago.



108. P. Nallathamby, T. Huang, **X. Xu\***, “Development of single nanoparticle biosensors for imaging of single protein molecules on single living cells”, Pittcon’2009, Chicago.
107. P. Nallathamby, K. Lee, **X. Xu\***, “Design of stable single nanoparticle photonics for *in vivo* imaging”, Pittcon’2009, Chicago.
106. **X. Xu\***, “Photostable single nanoparticle biosensors for molecular imaging of single living cells”, National Nano Engineering Conference (Boston, Nov. 12-13, 2008) (**invited**).
105. 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”, The 236<sup>th</sup> ACS National Meeting, Philadelphia, 2008.
104. 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”, The 236<sup>th</sup> ACS National Meeting, Philadelphia, 2008.
103. **X. Xu\***, “Design of biocompatible single nanoparticle optics for biomedical imaging”, National Nano Engineering Conference (Boston, Nov. 14-15, 2007) (**invited**).
102. **X. Xu\***, P. D. Nallathamby, T. Huang, K. Lee, “*In vivo* imaging using single nanoparticle photonics”, SERMACS 2007 (SC, Oct. 24-27, 2007) (**invited**).
101. **X. Xu\***, T. Huang, P. Nallathamby, D. Gillet “Design of single nanoparticle optical sensors for imaging and characterization of single receptor molecules on single living cells”, 234<sup>th</sup> ACS National Meeting (Boston, Aug. 19-23, 2007) (**invited**).
100. **X. Xu\***, P. 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**).
99. **X. Xu\***, P. Nallathamby, T. Huang, Y. Song, J. Lowman, V. Pravodelov, “Single nanoparticle assay for real-time molecular study of cellular function of single living cells”, Pittcon 2007, Chicago, IL (**invited**).
98. P. Nallathamby, T. Huang, **X. Xu\***, “Design of stable and biocompatible nanoparticle probes for single molecule study of single living cells”, Pittcon’2007, Chicago, IL.
97. K. Lee, P. Nallathamby, L. Browning, C. Osgood, **X. Xu\***, “Study of biocompatible of nanomaterials *in vivo*”, Pittcon’2007, Chicago, IL.
96. **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**).
95. **X. Xu\***, P. Nallathamby, T. Huang, V. Pravodelov, H. Xu, W. Brownlow, “Design of single nanoparticle optics for molecular imaging single living cells”, 232<sup>th</sup> ACS National Meeting, (Physical Chemistry Division, San Francisco, Sept. 10-14, 2006) (**invited**).

94. W. Brownlow, S. Kyriacou, P. 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**)
93. **X. Xu\***, P. Nallathamby, V. Pravodelov, W. Brownlow, H. Xu, “Development of single nanoparticle optics for single living cell imaging”, Pittcon’2006, Orlando, FL.
92. **X. Xu\***, P. Nallathamby, H. Xu, “Molecular analysis of cellular pathways and functions using single nanoparticle assay,” Pittcon’2006, Orlando, FL.
91. **X. Xu\***, H. Xu, P. Nallathamby, W. Brownlow, “Real-time tuning membrane transport and subcellular structures of single living cell using electric fields”, Pittcon’2006, Orlando, FL.
90. **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**).
89. **X. Xu\***, “Development of single nanoparticle optics for single living cell imaging”, 13th NSF Workshop On Materials Chemistry & Nanoscience (Oct 28-31, 2005) (**invited**).
88. **X. Xu\***, P. Nallathamby, R. Jeffers, “Single nanoparticle optics assay for sensing single protein molecules on single living cells”, 230<sup>th</sup> ACS National Meeting (DC, Aug. 28-Sept. 1, 2005) (**invited**).
87. **X. Xu\***, P. Nallathamby, W. Brownlow, S. Kyriacou, “Single nanoparticle optics for real-time imaging membrane transport of single living cells”, 230<sup>th</sup> ACS National Meeting (DC, 2005) (**invited**).
86. 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”, DOE Investigators Meeting (Bethesda, April 25-27, 2005) (**invited**).
85. **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.
84. M. Khalid, C. Zhou\*, A. Bassi, H. Gerber, 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.
83. **X. Xu\***, W. Brownlow, S. Kyriacou, “Real-time probing of membrane transport in living microbial cells using single nanoparticle optics and living cell imaging”, Pittcon’2005.
82. **X. Xu\***, W. Brownlow, S. Kyriacou, “Single-molecule study of subcellular function in single living cells”, Pittcon’2005.
81. P. Nallathamby, **X. Xu\***, “Study of single ligand-receptor interactions on single live cell using single nanoparticle optics assay”, Pittcon’2005.

80. **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”, 2004 Bioelectromagnetics Society (BEMS) Annual Meeting (invited).
79. 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”, 2004 Bioelectromagnetics Society (BEMS) Annual Meeting (invited).
78. C. Steel, **X. Xu\***, “Study of biocompatibility of silver nanoparticles in bulk phase and at the single-cell resolution”, Pittcon 2004.
77. C. Steel, **X. Xu\***, “Real-Time probing of bacterial communication and growth: single cells versus clusters”, Pittcon 2004.
76. Q. Wan, **X. Xu\***, “Real-time probing of the effect of high electric field on subcellular functions”, Pittcon 2004.
75. **X. Xu\***, W. Brownlow, C. Steel, “Single molecule detection of subcellular events in single live cells”, SERMACS 2003 (invited).
74. **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).
73. **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
72. **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).
71. **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.
70. C. Steel, **X. Xu\***, “Study of hyper-elongation of *Pseudomonas aeruginosa* in antibiotics using single live-cell imaging”, Pittcon 2003.
69. Q. Wan, C. Steel, **X. Xu\***, “Single live cell imaging of chromosome replication of *Pseudomonas aeruginosa*”, Pittcon 2003.
68. C. Steel, **X. Xu\***, “Study of multidrug resistance in cancer cells using live cell imaging and nanoprobe”, Pittcon 2003.
67. Q. Wan, **X. Xu\***, “*In vivo* study of the function of apoptotic peptide tBid and nBid using fluorescence resonance energy transfer (FRET)”, Pittcon 2003.

66. **X. Xu\***, R. Jeffers, W. Brownlow, J. Viola, "Electrochemiluminescence study of HIV receptors and tumor markers" 224th ACS National Meeting, Boston (08/2002) (invited).
65. **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).
64. **X. Xu\***, R. Jeffers, J. Chen, W. Brownlow, S. Kyriacou, "Exploring living interfaces using single-molecule detection", FACSS 2002 (invited).
63. **X. Xu\***, R. Jeffers, S. Huang, J. Chen, "Single-molecule studies of single living cells", 222nd ACS National Meeting, Chicago (08/2001) (invited).
62. **X. Xu\***, S. Huang, J. Chen, S. Kyriacou, R. Jeffers, "Single-molecule studies of membrane pump machinery", International Society for Optical Engineering (Photonics West-SPIE)/BiOS 2002, (San Jose, CA) (invited).
61. **X. Xu\***, R. Jeffers, "Single molecule probes of single ligand-receptor interaction on living cell surfaces", International Society for Optical Engineering (Photonics West-SPIE)/BiOS 2002, (San Jose, CA) (invited).
60. E. S. Yeung, **X. Xu**, S. Kang, J. Zheng, "Alignment at a solid-liquid interface and its implications on the double layer", The 222nd ACS National Meeting, Chicago, 2001. (invited)
59. **X. Xu\***, J. Chen, R. Jeffers, S. Huang, M. Nowak, "Single-molecule dynamics and interactions at living interface", 221st ACS National Meeting, San Diego, 2001.
58. **X. Xu\***, R. Jeffers, S. Huang, M. Nowak, H. Yoneyama, "Single-molecule analysis in biomedical sciences", International Society for Optical Engineering (Photonics West-SPIE)/BiOS 2001, (San Jose, CA) (invited).
57. **X. Xu\***, S. Huang, "Single-molecule biosensing and chemical microscopy", Pittcon 2001.
56. **X. Xu\***, K. Salaita, S. Huang, R. Jeffers, "Study of gold nanoparticles", Pittcon 2001.
55. **X. Xu\***, M. Nowak, S. Huang, H. Yoneyama, "Probing of multi-antibiotic efflux pump machinery using fluorescence spectroscopy and electrochemiluminescence", Pittcon 2001.
54. R. Jeffers, **X. Xu\***, "Novel ultrasensitive solution-phase immunoassay of tumor markers in serum samples using electrochemiluminescence", Pittcon 2001.
53. R. Jeffers, **X. Xu\***, "Biomedical applications of nanoparticle probes", Pittcon 2001.
52. **X. Xu\***, S. Huang, M. Nowak, R. Jeffers, "Single-molecule probing of biomechanics", Pittcon 2001
51. **X. Xu\***, Z. Wen, R. Jeffers, J. Gao, "Single-molecule induction of single-cell immune response", Pittcon 2000 (invited).

50. **X. Xu\***, Z. Wen, "Molecular analysis of HIV receptors and neutralizing antibody using electrochemiluminescence", Pittcon 2000.
49. R. Jeffers, **X. Xu\***, "A novel solution phase immunoassay of prostate specific antigen using electrochemiluminescence", Pittcon 2000.
48. R. Jeffers, **X. Xu\***, "Nanoparticle probes for use in biomolecular sensing", Pittcon 2000.
47. J. Gao, **X. Xu\***, "Real-time monitoring of single biomolecules using total internal reflection fluorescence microscopy", Pittcon 2000.
46. **X. Xu\***, R. Jeffers, H. Yoneyama, "Ultrasensitive analysis of protein-protein interactions", FACSS 2000, (invited).
45. **X. Xu\***, R. Jeffers, J. Gao, H. Yoneyama, "Single-molecule dynamics and interactions", FACSS 2000, (invited).
44. **X. Xu\***, J. Gao, R. Jeffers, B. Logan, Z. Wen, "Molecular analysis of biomarkers for the earlier cancer detection", International Society for Optical Engineering (Photonics West-SPIE)/BiOS 2000, (invited).
43. **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).
42. **X. Xu\***, Z. Wen, J. Gao, "Single-molecule assay of tumor markers in T-cell apoptosis", The First NASA/NCI Workshop, JPL-Caltech (06/99) (invited).
41. **X. Xu\***, J. Gao, Z. Wen, R. Jeffers, "Single-molecule analysis of ligand-receptor interactions", After the Genome-V, Jackson Hole, Wyoming (10/99) (invited).
40. **X. Xu\***, J. Gao, Z. Wen, R. Jeffers, "Emerging applications of single-molecule analysis in biomedical sciences", Single-Molecule Analysis & Applications, Boston (08/99) (invited).
39. **X. Xu\***, Z. Wen, "Electrochemiluminescence study of HIV receptors", FACSS 1999 (invited).
38. **X. Xu\***, J. Gao, "Dynamics of single neurotransmitter molecules", FACSS 1999 (invited).
37. E. S. Yeung, **X. Xu**, M. Shortreed, "Single-molecule spectroscopy", Pittcon 1999 (invited).
36. Z. Wen, **X. Xu\***, "Real-time sensing HIV biomarkers using electrochemiluminescence detection", Pittcon 1999.
35. **X. Xu\***, Z. Wen, "Single-molecule monitoring of HIV proteins in T cell immune response", Pittcon 1999.
34. **X. Xu\***, Z. Wen, "Single-molecule immunoassay of tumor markers", Pittcon 1999.

33. Z. Wen, **X. Xu**<sup>\*</sup>, "Ultrasensitive analysis of HIV receptors and neutralizing antibodies using electrochemiluminescence", 1999 Virginia Academy of Science.
32. Z. Wen, B. Logan, R. Jeffers, **X. Xu**<sup>\*</sup>, "Electrochemiluminescence study of the interaction of biomolecules", 1999 Virginia Academy of Science.
31. R. Jeffers, B. Logan, Z. Wen, **X. Xu**<sup>\*</sup>, "Determination of prostate specific antigen using nanoparticle probes", 1999 Virginia Academy of Science.
30. **X. Xu**<sup>\*</sup>, J. Gao, Z. Wen, "Real-time monitoring of single biomolecules using laser-induced native fluorescence microscopy", 1999 Virginia Academy of Science.
29. **X. Xu**<sup>\*</sup>, Z. Wen, B. Logan, "Real-time sensing of HIV biomarkers at molecule level", The Gordon Research Conferences on Bioanalytical Sensors, Ventura, CA (01/1999).
28. **X. Xu**<sup>\*</sup>, 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).
27. **X. Xu**, E. S. Yeung, "Chemical monitoring of single neurotransmitter molecules using laser-induced native fluorescence microscopy", FACSS 1998, Austin, TX (**invited**).
26. E. S. Yeung, **X. Xu**, "Microscale separations: from single cells to single molecules", Pittcon 1998, New Orleans, LA (**invited**).
25. **X. Xu**, E. S. Yeung, "Real-time monitoring of single-protein retention and partition at the liquid/solid interfaces", Pittcon 1998, New Orleans, LA.
24. E. S. Yeung, **X. Xu**, "Single-molecule dynamics in solution: from chromatography to medical diagnostics", Pittcon 1998, New Orleans, LA (**invited**).
23. **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).
22. **X. Xu**, E. S. Yeung, "Single-molecule imaging of chromatographic interactions and interfacial structures", 1998 EAS Conference, Somerset, NJ.
21. **X. Xu**, E. S. Yeung, "Real-time monitoring of single-molecule reactions in free solution", FACSS 1997, Providence, RI (**invited**).
20. **X. Xu**, E. S. Yeung, "Real-time monitoring of single-molecule reactions in aqueous solution", The 213rd ACS National Meeting, San Francisco, CA (1997) (**invited**).
19. E. S. Yeung, **X. Xu**, "Direct measurement of single-molecule dynamics in free solution", The 213rd ACS National Meeting, San Francisco, CA (1997) (**invited**).
18. **X. Xu**, E. S. Yeung, "Direct observation of single-molecule events", Pittcon 1997, Atlanta, GA.
17. **X. Xu**, E. S. Yeung, "Chemical movies of single ion-exchange", The Gordon Research Conferences on Analytical Chemistry, New England College, NH (Summer 1997).

16. E. S. Yeung, **X. Xu**, "Following the reaction of single molecules: implications on molecular conformations and microenvironments", 1996 Eastern Analytical Symposium, Somerset, NJ (**invited**).
15. **X. Xu**, E. S. Yeung, "Watching single-molecule behavior in aqueous solution by total internal reflection fluorescence microscopy", FACSS 1996.
14. E. S. Yeung, W. Tan, **X. Xu**, S. J. Lillard, "Chemical movies of single cells and single molecules", FACSS 1996, Kansas City, MO (**invited**).
13. E. S. Yeung, S. J. Lillard, W. Tong, **X. Xu**, "Analytical instrumentation in the fourth dimension", The 212nd ACS National Meeting, Orlando, FL (1996) (**invited**).
12. **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).
11. **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).
10. **X. Xu**, A. J. Bard, "Electrochemiluminescent investigation of DNA biosensor and antibody affinity", Pittcon 1996, Chicago, IL.
9. **X. Xu**, A. J. Bard, "Immobilization and hybridization of DNA on an aluminum (III) alkanebisphosphonate film with electrochemiluminescent detection", The 210th ACS National Meeting, (1995).
8. **X. Xu**, A. J. Bard, "DNA biosensors with electrochemiluminescent detection", The First Conference for Worldwide Young Chinese Chemists, Peking University, China (1995) (**invited**).
7. **X. Xu**, A. J. Bard, "Electrochemiluminescent investigation of antibody affinity", The First Conference for Worldwide Young Chinese Chemists, Peking University, China (1995).
6. **X. Xu**, K. Shreder, B. Iverson, A. J. Bard, "Electrochemiluminescent investigation of antibody affinity", The 46th International Society of Electrochemistry, Xiamen, China (1995) (**invited**).
5. **X. Xu**, A. J. Bard, "Sensing DNA using electrochemiluminescence", The 46th International Society of Electrochemistry, Xiamen, China (1995) (**invited**).
4. **X. Xu**, A. J. Bard, "Electrogenerated chemiluminescent emission from adsorbed layers of  $\text{Ru}(\text{bpy})_3^{2+}$  and  $\text{Ru}(\text{dp-bpy})_3^{2+}$  on a highly order pyrolytic graphite (HOPG)", Southwest Regional Meeting of the ACS, Austin, TX (1993).
3. **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", International Symposium on Molten Salt Chemistry & Technology, (1993) (**invited**)

2. **X. Xu**, C. L. Hussey, "Electrodeposition of metals from room-temperature chloroaluminate molten salts", The Eighth International Symposium on Molten Salts, (1992) (**invited**).
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:**

69. **X. Xu\***, "Following Single Live Cells: From Fundamental Discoveries to Biomedical Applications", Temple University (2019) (**invited**).
68. **X. Xu\***, "New Nano Tools for Following Single Live Cells", University of Connecticut (2019) (**invited**).
67. **X. Xu\***, "New Nano Tools for Following Single Live Cells: From Fundamental Discoveries to Biomedical Applications", University of Virginia (2018) (**invited**).
66. **X. Xu\***, "Real-time Imaging of Single Live Cells for Biomedical Applications", Bioelectric Center, Old Dominion University (2018) (**invited**).
65. **X. Xu\***, "New Imaging Tools for Following Single Live Cells: From Fundamental Discoveries to Biomedical Applications", Old Dominion University (2017) (**invited**).
64. **X. Xu\***, "New Tools for Real-time and Molecular Imaging of Single Live Cells", University of Maryland, College Park (2016) (**invited**).
63. **X. Xu\***, "New Tools for Real-time Imaging of Single Live Cells", Integrative Neuroscience Lecture Series, Center for Biomedical Research Excellence, University of Nevada, Reno (2015) (**invited**).
62. **X. Xu\***, "New Nanochemistry Tools for Real-time and Single-Molecular Imaging of Single Live Cells", Old Dominion University (2015) (**invited**).
61. **X. Xu\***, "New Tools for Real-time Study of Nanotoxicity", Chinese Academy of Sciences, Beijing (2014) (**invited**).
60. **X. Xu\***, "Single-molecule Nanoparticle Biosensors for Deciphering of Cellular Functions", Chinese Academy of Sciences, Beijing (2013) (**invited**).
59. **X. Xu\***, "Nanophotonics Biosensors for Probing of Life Sciences", CUNY Advanced Science Seminar Series (2013) (**invited**).
58. **X. Xu\***, "Deciphering Functions of Single Live Cells One-Molecule-at-a-Time", ODU-Department of Biology (2013) (**invited**).
57. **X. Xu\***, "Single-molecule Nanoparticle Biosensors for Super-Resolution Imaging of Single Live Cells", University of California, Riverside (2013) (**invited**).
56. **X. Xu\***, "Nanoparticle Biosensors for Super-Resolution and Single-Molecule Imaging of Single Cells", ODU-BME Innovation Seminar Series (2012) (**invited**).
55. **X. Xu\***, "Showcase Powers of Chemical and Nano Sciences", Old Dominion University (2012) (**invited**).



54. **X. Xu\***, “Super-Resolution Single Molecule Imaging of Single Ligand-Receptor Interactions on Single Live Cells”, CEA-Saclay, France (2011) **(invited)**.
53. **X. Xu\***, “Design of Photostable Plasmonic Nanoparticle Probes and Biosensors for Molecular Imaging of Single Living Cells”, University of Cincinnati (2011) **(invited)**.
52. **X. Xu\***, “Design of Photostable Plasmonic Nanoparticle Probes and Biosensors for Molecular Imaging of Single Living Cells”, University of Chinese Academy of Sciences, Beijing, China (2011) **(invited)**.
51. **X. Xu\***, “Single Molecule Imaging of Single Live Cells”, Xiamen University (2011) **(invited)**.
50. **X. Xu\***, “Design of Photostable Nanoparticle Probes for Molecular Imaging of Single Living Cells”, Hampton University (2011) **(invited)**.
49. **X. Xu\***, “New Frontiers in Nanobiotechnology: Probing of Multidrug Membrane Transporters in Single Living Cells Using Single Nanoparticle Optics”, Davidson College (2010) **(invited)**.
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", 1<sup>st</sup> Annual Public Lecture of NIRT Program at ODU (2005)
33. **X. Xu\***, "Novel NanoBiotechnology", Nanoscience and Nanotechnology Meeting, Sigma Xi (2004) **(invited)**
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, ODU (2004) **(invited)**.
31. **X. Xu\***, "Molecular Study of Multidrug Resistance Using Nanoparticle Optics and Live Cell Imaging", Inst. for Struct. Bio. & Drug Discovery, Virginia Commonwealth University (2003) **(invited)**
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", 1<sup>st</sup> MURI Meeting at Purdue University, (2002) **(invited)**
28. **X. Xu\***, "Single-molecule Study of Single Living Cells", ODU Physics Colloquium, (2001) **(invited)**
27. **X. Xu\***, "Single-molecule Detection in Single Live Cells", University of Pittsburgh, (2001) **(invited)**
26. **X. Xu\***, "Single-molecule Dynamics at Living Interfaces", Univ. of Wisconsin at Madison, (1999) **(invited)**
25. **X. Xu\***, "Real-time Imaging of Single Live Cells", Eastern Virginia Medical School (1999) **(invited)**
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 Electrogenenerated Chemiluminescence", The City University of New York, (1996) (**invited**).
10. **X. Xu**, "Novel DNA Biosensors with Electrogenenerated 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 Electrogenenerated Chemiluminescence", International Electrochemiluminescence Advisory Board Meeting, Austin (1995) (**invited**).
4. **X. Xu**, "Immobilization of DNA on an Aluminum (III) Alkanebisphosphonate Thin Film with Electrogenenerated Chemiluminescent Detection", The University of Texas at Austin, (1994)
3. **X. Xu**, "Electrochemical and Electrogenenerated 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 Electrogenenerated 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).

## **Student Thesis and Dissertation Directed**

9. Martha Johnson (mentor: **X. Xu**), “Study of Effects of Silver Ions and Nanoparticles on embryonic Development”. Dissertation. Old Dominion University, Norfolk, VA (May 2019).
8. Preeyaporn Songkiatisak (mentor: **X. Xu**), “Study of ABC membrane transporter in single live cells”. Dissertation. Old Dominion University, Norfolk, VA (May 2018).
7. Pavan K. Cherukuri (mentor: **X. Xu**), “Design of drug nanocarriers for study of multidrug resistance in single live cells”. Dissertation. Old Dominion University, Norfolk, VA (2016).
6. Lauren M. Browning (mentor: **X. Xu**), “New tools for real-time study of embryonic development”. Dissertation. Old Dominion University, Norfolk, VA (2013). (COS Distinguished Dissertation Award)
5. Feng Ding (mentor: **X. Xu**), “Structural and functional study of multidrug membrane transporters”. Dissertation. Old Dominion University, Norfolk, VA (2013).
4. Kerry J. Lee (mentor: X. Xu), “Design of *in vivo* assay for study of transport, biocompatibility and toxicity of nanoparticles”. Dissertation. Old Dominion University, Norfolk, VA (2012).
3. Prakash D. Nallathamby (mentor: **X. Xu**), “Design and synthesis of photostable nanoparticle probes for molecular imaging and sensing in life science”. Dissertation. Old Dominion University, Norfolk, VA (2010).
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).
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 (2003).

## **Directing, Mentoring & Supervision:**

### Postdocs:

- Dr. Badri Bhattarai (03/2019-06/2020)
- Dr. Pon Songkiatisak (06/2018-04/2020)
- Dr. Pavan Cherukui (2016-2017)
- Dr. Lauren Browning (2014)
- Dr. Tao Huang (2006-2008; 2009-2012: research scientist)
- Dr. Prakash Nallathamby (2010-2011)
- Dr. Ardi Vahedi (2009-2010)
- Dr. Yujun Song (2005-2007)
- Dr. Hongwu Xu (2005-2007)
- Dr. J. Chen (2000-2001)
- Dr. J. Gao (1999-2000)

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

- Rebecca Richardson (2017-)
- Krishna K. Raut (2017-)
- Martha Johnson (PhD conferred 05/2019)
- Pon Songkiatisak (PhD conferred 05/2018)
- Pavan Cherukuri (PhD conferred 12/2016) (Doing postdoc)
- Lauren Browning (PhD conferred 12/2013)
- Feng Ding (PhD conferred 12/2013) (Assistant Professor at Wenzhou Medical School)
- Kerry Lee (PhD conferred 05/2012) (Assistant Professor at Florida Gulf Coast University)
- Prakash Nallathamby (PhD conferred in 05/2010) (Assistant Prof. University of Notre Dame)
- R. Patel (2002-2003)
- C. Steel (2001-2002)
- S. Huang (2000-2001)
- R. Jeffers (1999-2002)
- Z. Wen (1998-1999)

Ph.D. Students in Engineering:

- Zeina Aman (01/2015-05/2016)
- Kevin Fontenot (summer 2013)

Master Students in Chemistry, Biochemistry or Biotech

- Sophia Kyriacou (MS in chemistry conferred 2003) (Pursued/received PhD from Miami U.)
- William Brownlow (MS in chemistry conferred 2006) (Staff Researcher at Midwestern Univ.)
- Tanvi Desai (MS in Biotech conferred in 2008) (Pursued/received PhD from Rice in 2014; Currently at Merck)

Undergraduate Students: BS in Chemistry, Biochemistry, Physics, and Engineering

- Regan Allen (2018-2019)
- Andrea Zourou (2017-2019)
- Ashley Coffell (2018) (Class 2018)
- Elton Sykes (2017-2018)
- Briana Gallagher (2017)
- Priscilla Prem (2015-2016) (Class 2017)
- Alice Gabrielov (2014-2016) (Class 2016)
- Sang Phan (2014-2016) (Class 2016)

- Khamisha Grant (2014-2015)
- Nicole Gonda (2013-2014)
- Maria Buck (Spring 2014)
- Nicholas Collett (Spring/summer 2014)
- Seth Warren (2010-2014) (outstanding graduate senior, BS in biochemistry) (Class 2014)
- Clint-Jomar Bruno (2011-2012) (Class 2014)
- Kaleigh V. Wiley (2011) (outstanding graduate senior, BS in biochemistry) (Class 2014)
- Epi Perez (2009-2011) (Class 2012)
- Kevin Kircheval (2010-2012) (Class 2012)
- Jill Lowman (2006-2009) (Class 2009)
- Elizabeth S Dupont (2006-07) (outstanding graduate senior, BS in chemistry) (Class 2007)
- Vassiliki Pravodelov (2005-07) (outstanding graduate senior, BS in biochemistry) (Class 2007)
- Rodney K Reed (2005-06) (Class 2007)
- Renee Baker (2002-2003) (Class 2004)
- Joshua Viola (2002-2004) (Class 2004)
- Juan P. Rodriguez (2002-2004) (Class 2004)
- Chris Manno (2001-2003) (BS in physics, work on his senior project under me) (Class 2003)
- Khalid Salaita (1999-2001) (Tenured Full Professor in Emory University) (Class 2001)
- Michelle Nowak (1998-2000) (outstanding graduate senior, BS in biochemistry) (Class 2000)
- Brad Logan (1998-2000) (BS in both chemistry and engineering) (Class 2000)

#### Honor Undergraduate Students:

Research Experiences for freshmen (Chem 135/138: Accelerated General Chemistry)

Design & Direct Research Project entitled

“Synthesis and Characterization of Nanoparticles for their Applications in Life Sciences”

- Justin Refugia (Spring 2014)
- Chris Ohlhaber (Spring 2013)
- Abbas Yosefi (Spring 2012)
- Seth Warren (Spring 2011)
- Kaleigh Wiley (Spring 2011)
- Lauren B. Obeng (Spring 2009)
- Epifanio Perez (Spring 2009)

### High School Students (Summer Research Interns)

- Anto Ochs (Summer 2014)
- Jesse Gora (Summer 2013)
- Meghan Costello (Summer 2012)
- Connor Leary (Summer 2011)
- Brain Li (Summer 2010)

### Visiting Scholars:

- Prof. Liqiang Chen: Yunnan University, Chinese Ministry of Education Fellowship (2015-2016)
- Prof. Yongsheng Ding: Univ. of Chinese Academy of Sciences (CAS), CAS fellowship (2015)
- Dr. Hiroshi Yoneyama: Tokai University, Ministry of Health and Sciences of Japan fellowship (1999-2000) (Currently tenured associate professor in Tohoku University, Sendai, Japan)

### Advisory and Dissertation/Thesis Committee

#### Chair/Director:

- 2017-2019: Rebecca Richardson (PhD student in Chemistry)
- 2017-2019: Krishna K. Raut (PhD student in Chemistry)
- 2013-2019: Martha Johnson (PhD student in Biomedical Sciences, conferred 05/2019)
- 2011-2017: Pon Songkiatisak (PhD in Biomedical Sciences, conferred 05/2018)
- 2010-2016: Pavan Cherukuri (PhD in Biomedical Sciences, conferred 12/2016)
- 2008-2013: Lauren Browning (PhD in Biomedical Sciences, conferred 12/2013)
- 2009-2013: Feng Ding (PhD in Biomedical Sciences, conferred 12/2013)
- 2007-2012: Kerry Lee (PhD in Biomedical Sciences, conferred 05/2012)
- 2004-2010: Prakash Nallathamby (PhD in Biomedical Sciences, conferred 05/2010)
- 2000-2003: Sophia Kyriacou (MS in chemistry, conferred 2003)
- 2003-2006: William Brownlow (MS in chemistry, conferred 2006)

#### Committee Member:

- 2020-: Ankit Bhanudas (PhD student in ECE, conferred 08/2020)
- 2017-present: Dan Wang (PhD student in Chemistry)
- 2013-2019: Kristen Bashaw (PhD student in Chemistry, conferred 12/2019)
- 2013-2018: Anji Chen (PhD in Chemistry, conferred 08/2018)
- 2014-2015: Richard Jones (PhD student in Chemistry)
- 2003-2009: Chuanyin Shi (PhD in Biomedical Sciences, conferred 12/2009)
- 1999-2000: Laura Marcucci (PhD in Physics, conferred 2000)

**TEACHING:**

**Developed 4 new courses, Reconstructed 2 courses and Taught 21 different courses given below:**

**Taught 14 different graduate courses given below**

- Frontiers in Nanoscience and Nanotechnology (Chem/Bio/ECE 560: **new course**, 2009-)
- Instrumental Analysis (Chem 708)
- Physical Biochemistry (Chem 775)
- Advanced Techniques in Clinical Chemistry (Chem 732/832)
- Advanced Techniques in Biochemistry (Chem 762/862) (Redesign the course)
- Advanced Analytical Chemistry (Chem 701) (**new course**)
- Advanced Analytical Chemistry (Chem 702) (**new course**)
- Analytical Separation Methods (Chem 552) (**new course**)
- Biomedical Sciences Laboratory (Chem 813-815) (Restructure the course)
- **Biomedical Engineering II: Applications (BME 501)** (team-taught)
- Master Research (Chem 698)
- Master Thesis (Chem 699)
- Doctoral Research (Chem 898)
- Doctoral Dissertation (Chem 899)

**Taught 10 different undergraduate courses listed below:**

- Neurotechnology (Chem 175T)
- Frontiers in Nanoscience and Nanotechnology (Chem/Bio/ECE 460: **new course**, 2009- )
- **Biomedical Engineering II: Applications (BME 401)** (team-taught)
- Instrumental Analysis (Chem 422)
- Analytical Chemistry Lecture (Chem 321)
- Analytical Chemistry Laboratory (Chem 322)
- College Chemistry (Chem 102-N)
- Introductory Organic and Biochemistry (Chem 107N)
- Introductory Chemistry (Chem 105N)
- Accelerated General Chemistry Lab (Chemistry 138, Direct Research Portion), 2009-2014
- Active faculty member in interdisciplinary Ph.D. program in Biomedical Sciences: 1998-present
- Faculty member in PhD program in Biomedical Engineering:
- Director of graduates and undergraduates for their laboratory training and thesis research: 1998-
- Member of dissertation committee for students in the Department of Physics, Chemistry and Biochemistry



## **Department, University and Virginia State Committee Services & Leadership:**

2019-present: Member of Advisory Board, Frank Reidy Research Center for Bioelectronics

2018-present: Group coordinator/leader of the Virginia Neuroscience Initiative

2009-present: Department full professor promotion committee

2004-present: Department tenure and promotion committee

2010: Full professor promotion committee of College of Health Sciences

2008: Active member of a university committee for Micro & Nano Technology Research Initiative

2001-2012: Biological Chemistry Track Coordinator/Director of an interdisciplinary Ph.D. program in Biomedical Sciences, and member of executive committee of the program: actively lead and recruit excellent students and increase the enrollment and productivity of graduate students; actively recruit and encourage faculty members to participate in this interdisciplinary program. This track continues thriving, despite many reconstructions over years.

2000-2012: Faculty search committees: help to recruit excellent new faculty members.

2000: Departmental representative and organizer of Commonwealth of Virginia Campaign: Our department exceeded the campaign goal and won the award from the college in 2000.

1999-2000: Departmental library representative: promote the subscription of on-line journals.

1999-2004: Technology committee: actively promote the web site development and multi-media presentation.

1998-present: Graduate student committee in chemistry & biochemistry: actively recruit graduate students.

## **Selected Professional Societies, Leadership and Services (See Pages 4-7)**

- American Chemical Society (ACS) (1990-present):
  - 2020: Reviewer (jury) of Awards for ACS Division of Analytical Chemistry
  - 2018 ACS joint Board-Council Committee on Publications
  - 2016-2021: Alternative Councilor and member of executive committee, ACS Division of Analytical Chemistry (2016-21) (Elected in 2015 & Re-elected in 2018)
  - 2012-2014: Reviewer (jury) of Spectrochemical Analysis Award, ACS Division of Analytical Chemistry
- American Association for the Advancement of Sciences (AAAS) (1996-present) (an elected AAAS Fellow in 2011)
- Society of Neuroscience (2017-present)
- Active Member of Electrochemical Society (1991-2004)