X. Nancy Xu, Ph.D.

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Highlight & Summary: Facts & Figures

- Highly Competitive Federal Grants Awarded: $10,858,264 in total
- Selected Major National Awards and Honors:
  - American Association for the Advancement of Science (AAAS) Fellow
  - American Institute for Medical and Biological Engineering (AIMBE) Fellow
  - The American Chemical Society (ACS) Fellow
  - AAAS Mentor Award (one awardee selected annually nationwide)
  - ACS Division of Analytical Chemistry Roland F. Hirsch Award
  - Nanotech Briefs Nano 50 Innovator Award
  - Nanotech Briefs Nano 50 Technology Award
  - One of 16 finalists nationwide in the NIH Follow That Cell challenge
  - One of 36 EAGER awardees nationwide under the NSF BRAIN Initiative
  - Associate Editor in Nanobiotechnology, *Frontiers in Bioengineering and Biotechnology*, *Frontiers in Molecular Biosciences*, and *Frontiers in Materials*.
- Selected University Research Awards:
  - Faculty Research Achievement Award – T*he highest research honor bestowed upon a faculty member by the University; one recipient selected annually*
    Recognizes exceptional and sustained achievements in research and scholarly contributions.
  - Distinguished Research Award - Recognizes outstanding research accomplishments and significant contributions to the advancement of knowledge.
- Research Publications and Scholarly Impact:
  - 68 peer-reviewed publications in high-impact, leading journals published by ACS, RSC, and AAAS, including *Science, Journal of the American Chemical Society (JACS), ACS Nano, Nano Letters, Nanoscale, Analytical Chemistry, Biochemistry,* and *Analyst*, among others.
  - Citation impact: 6,215 citations; h-index = 38; i10-index = 59 *(as of August 2026)*.
- Top 15 Key Technology and Methodological Innovations
  - **Single-Nanoparticle Optics:** Development of optical methods for characterizing and monitoring individual nanoparticles.
  - **Single-Nanoparticle Plasmonic Spectroscopy:** Development of ultrasensitive spectroscopic approaches for probing individual plasmonic nanoparticles and their nanoscale environments.
  - **Single-Nanoparticle Dark-Field Optical Microscopy and Spectroscopy (DFOMS)**: Development of dark-field optical microscopy and spectroscopy for real-time characterization of individual nanoparticles.
  - **Single-Molecule Nanoparticle Optical Biosensors (SMNOBS):** Development of nanoparticle-based optical biosensors for real-time detection and imaging of single biomolecular interactions.
  - **Photostable Optical Nanoscopy (PHOTON):** Development of photostable optical nanoscopy for long-term, high-resolution imaging of biological systems.
  - **Photostable Quantum/Nanomaterial Probes for Long-Term Single-Live-Cell Imaging:** Development of photostable nanomaterial probes enabling prolonged imaging of individual live cells over time.

- **Single-Molecule Bionanophotonics Tools for Live-Cell Imaging:** Development of optical and nanophotonic technologies for real-time visualization and analysis of single molecules in living cells.
- **Single-Nanoparticle Plasmonic Spectroscopy for Nanomaterial–Embryo Interactions:** Development of single-nanoparticle approaches to investigate the effects of nanomaterials on embryonic development.
- **Real-Time *In Vivo* Imaging of Developing Embryos and Their Nanoenvironments:** Development of single-nanoparticle plasmonic spectroscopy for imaging developing embryos and mapping their nanoscale environments *in vivo* in real time.
- **Embryonic *In Vivo* Assays for Nanomaterial Biocompatibility and Toxicity:** Development of early-developing zebrafish embryo assays for systematic investigation of the physicochemical and biological determinants of nanomaterial biocompatibility and toxicity.
- **Solution-Phase Single-Nanoparticle Protein Assays:** Development of ultrasensitive solution-phase assays for detecting and characterizing proteins at the single-nanoparticle level.
- **Novel Methods for Culturing Embryonic Stem Cells:** Development of new approaches (ultrashort electric pulsers) for the culture and maintenance of embryonic stem cells.
- **Total Internal Reflection Fluorescence Microscopy (TIRFM) for Single-Molecule Detection** — Development and application of TIRFM-based methods for the sensitive detection and characterization of individual molecules in solution and at solid–liquid interfaces.
- **Solution-Phase Electrochemiluminescence (ECL) Protein Assays for Biomarker Detection:** Development of highly sensitive solution-phase ECL assays for protein and biomarker detection.
- **Electrochemiluminescence (ECL) DNA Biosensors:** Development of ECL-based biosensing platforms for highly sensitive detection of DNA

- 1 book
- 202 invited presentations at national/international conferences
- 89 invited seminars at universities & research institutions
- Organized/Chaired 41 invited symposia at National/International Conferences
- Elected/Appointed to 5 National Offices at the American Chemical Society (ACS) & AAAS
  - ACS Joint Board-Council Committee on Publications (2018)
  - Alternative Councilor of ACS Analytical Chemistry Division (2016-2021)
  - Member of Executive Committee of ACS Analytical Chemistry Division (2016-2021) (Elected in 2015 and Re-elected in 2018)
  - Reviewer (juror) of the ACS Analytical Chemistry Division Award
  - Reviewer of the AAAS Award
- Expert Grant Reviewer for 15 national/international funding agencies:
  - 63 NIH study sections (63 times in 20 different subjects of NIH study sections)
  - 37 NSF panels (37 times in 17 different subjects of NSF review panels)
  - 2 EPA panels;
  - ACS; DoE; US State Department; DoD (US ARMRMC); Maryland Technology Development Corporation; National Academy of Science (NAS)
  - 7 international funding agencies (France, Germany, Hong Kong, Israel, Poland, Singapore, Switzerland)
  - University research initiatives (e.g., UC-Davis BRAIN Initiative)
- Leadership and Service:
  - 13 Nation, State, and University Leadership Positions and Committees:
  - Group leader/coordinator of the Virginia BRAIN Initiative
  - Member of the Advisory Board for Frank Reidy Research Center for Bioelectrics
  - Biological Chemistry Track Coordinator/Director of an interdisciplinary Ph.D. program in Biomedical Sciences, and member of the executive committee of the program:
- Directed and mentored:

  - 12 postdocs, 19 PhD students, 3 master students, 35 undergraduate students, 5 high-school students, and 3 visiting professors
- 9 Student-Recognized and Nominated Honors:
  - Student-Recognized High-Impact on the Educational Experiences of the First-Year Students (2025)
  - Shining Star Recognition (2015, 2018, 2020)
  - The AAAS Mentor awards (2020)
  - University Presidential Diversity Champion Award (2018)
  - Student-selected Most Inspiring Faculty Member (2002, 2005, 2007)

Selected Honors and Awards:

- 2026: Elected as Fellow of the ACS
- 2026: Elected as Fellow of the AIMBE
- 2025: Student-Recognized High-Impact on the Educational Experiences of the First-Year Students
- 2021-2022: Member of AAAS Award Review Committee
- 2020-present: Member of ACS Award Review Committee
- 2020 AAAS Mentor Award
- 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*
- 2019 ACS Division of Analytical Chemistry Roland F. Hirsch Award for Distinguished Service in the Advancement of Analytical Chemistry
- 2019-2021: Member of Advisory Board for Frank Reidy Research Center for Bioelectrics
- 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 the 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: Elected as a Fellow of the American Association for the Advancement of Science (AAAS)
- 2011 ACS certificate of appreciation for the valuable contribution and dedicated service in the peer-review of manuscripts subscribed to ACS journal
- 2011-2013: Certificate of appreciation for significant contributions, outstanding dedication, and valuable service to Ocean Lakes High School Mathematics and Science Academy (2011, 2012, 2013)
- 2010 Faculty Research Achievement Award (the highest univ. honor in research, one faculty/year)
- 2009 Distinguished Research Award of the College of Sciences
- 2008 Nanotech Briefs Nano 50™ Innovator Award
- 2007 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
- 1989-1992: Scholarship of The University of Mississippi

Education:

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

Professional Positions:

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

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

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

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

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

Initiated and established the following innovative research programs:

1) New nano biophotonic technologies and materials (photostable single nanoparticle optical probes) for real-time imaging of single live cells, cell-cell, and neuron-neuron communication, aiming to identify new biomarkers for early diagnosis of cancer and brain diseases, and new targets for the design of effective therapeutics.
2) New sensing and imaging tools (single plasmonic optical nanoparticle microscopy and spectroscopy) to design innovative molecular sensing and imaging technologies for the identification of new biomarkers and cellular functions *in vitro* and *in vivo*.
3) Innovative ultrasensitive molecular assays for the study of protein-protein interactions and identification and characterization of neutralized antibodies for the design of effective diagnostics and therapeutics.
4) New drug nanocarriers for the design of effective drug delivery and therapeutics
5) Real-time study of membrane transport and multidrug resistance mechanisms of single live cells
6) *In vivo* assays for the study of the dependence of nanotoxicity upon physicochemical properties of nanomaterials, aiming to design biocompatible nanomaterials for implantable devices rationally.
7) Real-time molecular study of effects of electromagnetic field on subcellular responses, aiming to rationally design smart drug delivery and regenerative medicine.

Postdoctoral Fellow: Ames Lab/US-DOE, Iowa State University (1996-98)

Mentor: **Prof. Edward S. Yeung**, Distinguished Professor

Initiated, performed, and established the following new research projects:

1) Developed total internal reflection fluorescence microscopy for single-molecule detection
2) Pioneered the study of 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: University of Texas at Austin (1993-95)

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

Initiated and developed the following new research projects:

1) Developed and characterized thin films for the immobilization and sensing of DNA
2) Invented novel DNA biosensors with electrochemiluminescent (ECL) detection
3) Characterized DNA biosensors using QCM, ECL, FTIR, and surface techniques (EM/AFM)

4) Studied the ECL emission of fluorescence quenching compounds and adsorbed species on electrodes

5) Published 3 papers in *JACS*, 1 paper in *Langmuir,* created 1 worldwide patent, and contributed to the translation of ECL assays to clinical diagnosis of biomarkers for early disease detection.

Research Assistant: Dept. of Chem. and Biochem., The University of Mississippi (1989-92)

Mentor: **Prof. Charles L. Hussey**, Distinguished Professor

Initiated, performed, and established the following new research projects:

1) Developed new methods for the study of metal depositions in room-temperature chloroaluminate molten salts.

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 the *Journal of Electrochemical Society* and 1 in *Proc. Of the International Symposium on Molten Salt Chemistry & Technology*

Selected Notable Professional Activities & Services:

Invited expert grant reviewer:

Member of NIH Study Sections (63 study sections):

- NIH Special Emphasis Panel for RM1, P grant (MBBC, 2022, mailing)
- 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 (41 panels):

- NSF Panelist on Science and Technology Centers
- NSF Panelist on Engineering Research Initiation
- NSF Panelist on Biosensors
- NSF Panelist on the Rules of Life
- NSF Panelist on Biomaterials
- NSF Panelist on Designing Materials to Revolutionize and Engineer our Future (DMREF)
- NSF Panelist on Convergence Accelerator for Technology, Innovation and Partnerships (TIP)
- NSF Panelist on Chemical Measurement & Imaging (CMI)
- 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 Panelist on Computer and Network Systems (CISE/CNS): Future of Semiconductors (FeSe2)
- NSF Panelist on Programmable Cloud Laboratory Test Bed program (PCL Test Bed)
- NSF National Quantum and Nanotechnology Infrastructure (NQNI)

EPA Grant Review Panelist: EPA Panelist on Impacts of Nanomaterials on Human Health

Invited expert grant reviewer: American Chemical Society (ACS); Department of Energy (DoE); French National Research Agency (ANR); German Research Foundation (DGF = 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 Material Command (USAMRMC)

Journal Editorial Service: Associate Editor in Nanobiotechnology (Frontiers in Bioengineering and Biotechnology, Frontiers in Molecular Biosciences, and Frontiers in Materials) (2023-present)

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:

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

Organized/Chaired Invited Symposia at National & International Conferences:

- Organizer/chair: **X. Xu**, invited symposium: "Advanced Single Cell Technology in Biology and Medicine", 2026 Pittcon, San Antonio, TX.
- Organizer/chair: **X. Xu**, invited symposium: "Biointerfaces &Sensing: Wearable, Biosensors and Organ-on-Chips", 2026 NanoBioTech & Biomedical Innovative Conference, Norfolk, VA.
- Organizer/chair: **X. Xu**, invited symposium: "Innovative Nanobiotechnology & Single Cell Imaging in Biology and Medicine", 2025 Fall ACS National Meeting, Washington, DC.

- Organizer/chair: **X. Xu**, invited symposium: "Innovative Nanobiotechnology for Advanced Diagnostics and Therapeutics", 2025 Pittcon, Boston, MA.
- Organizer/chair: **X. Xu**, invited symposium: "Nanotechnology, Single Molecule & Single Cell Analysis in Biology and Medicine", 2020 Fall ACS National Meeting, San Francisco (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 on 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 Headquarters, 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", 230th 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

Selected Grants Awarded: ($10,858,264 funded federal grants so far)

- 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 (R15 GM119116) [$465,000 04/2016-08/2021] (PI: Xu)
  Title: New Photostable Nanoprobes for Real-time Imaging of Single Live Cells
- NIH (R15 GM119116S) [$89,616; 08/2017-08/2021] (PI: Xu)
  Title: Research Supplement to Promote Diversity in Health-Related Research
- 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
- 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 the 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

- **2020** AAAS Mentor Award: highlight and recognition of accomplishments of successful student mentoring and promoting diversity and inclusion in academic environments [Link]
- **2019** ACS Division of Analytical Chemistry Roland F. Hirsch Award: highlight and recognition of distinguished scientific and service contributions to the field of analytical chemistry [Link]
- **2015**: Highlighted by NIH: *Follow That Cell Challenge,* "Photostable multiplexing nanoassays for real-time molecular imaging of single live cells" [link]
- **2015**: Highlighted by NSF: NSF Brain Initiative, "*Spying on Synapse*", Video at [Link1] & [Link2]
- **2013**: Journal Front-Cover Highlight, "Silver nanoparticles induce developmental stage-specific embryonic phenotypes in zebrafish", Journal Front-Cover Highlight, *Nanoscale* 5, 2013 [Link]
- **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, 2012 [Link]
- **2012**: Journal Front-Cover Highlight, "High-throughput ultrasensitive characterization of chemical, structural and plasmonic properties of EBL-fabricated single silver nanoparticles", *Nanoscale* 4, 2012 [Link]
- **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, 2010 [Link]
- **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, 2010 [Link]
- **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**: 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 [Link]
- **2006**: Featured by the Front Page of *The Virginian-Pilot*, "ODU Professor a Big Fish in A Teensy Pond", July 7, 2006 [Link]
- **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 Research Accomplishments & Publication Highlights

I. **Pioneering Single-Molecule Nanoparticle Sensing and Imaging Platforms**

Dr. Xu has pioneered the development of new single-molecule and single nanoparticle optical sensing and imaging platforms, including photostable single-molecule nanoparticle optical imaging probes, Single-Molecule Nanoparticle Optical Biosensors (SMNOBS), and Photostable Optical Nanoscopy (PHOTON). Her work aims to rationally design a new class of optical nanomaterials and develop photostable optical imaging probes and tools that overcome the intrinsic drawbacks of fluorescence-based imaging platforms, such as photobleaching and phototoxicity, for imaging live organisms (e.g., live cells and developing embryos) over extended periods.

She has demonstrated that these new optical nanomaterials and imaging tools can be used to study the signal transduction pathways of single live cells with nanometer spatial resolution and millisecond temporal resolution, achieving single-molecule sensitivity and quantification over long durations (hours to days).

Her discoveries include new dynamic and quantitative biological insights into the high heterogeneity of receptors on single live cells and their associated signaling dynamics and mechanisms. These highly innovative tools can be applied to investigate other cascade signaling pathways, advance our understanding of cellular functions, and support the design of more effective therapeutics. Applications include the identification of pre-disease biomarkers for early cancer detection, mapping drug-targeted sites, and characterizing vaccines.

Selected papers include:

1. 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); https://pubs.acs.org/doi/pdf/10.1021/ac0709706

2. 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); https://pubs.acs.org/doi/pdf/10.1021/ja8068853

3. P. Nallathamby, **X. Xu**,* "Study of cytotoxic and therapeutic effects of stable and purified silver nanoparticles on tumor cells" *Nanoscale* **2**, 942-952 (2010); https://pubs.rsc.org/en/content/articlepdf/2010/nr/c0nr00080a

4. K. J. Lee, L. Browning, T. Huang, F. Ding, P. Nallathamby, **X. Xu***, "Probing multidrug ABC membrane transporters of single living cells using single nanoparticle plasmonic optical probes", *Anal. Bioanal. Chem.* **397**, 3317-3328 (2010); https://link.springer.com/content/pdf/10.1007%2Fs00216-010-3864-8.pdf

5. T. Huang, **X. Xu***, "Multicolored nanometre-resolution mapping of single protein–ligand binding complexes using far-field photostable optical nanoscopy (PHOTON)", *Nanoscale* 3, 3567-3572 (2011) (Journal front-cover highlight; Featured in *Chemical and Engineering News*, P. 32, June 20, 2011); https://pubs.rsc.org/en/content/articlepdf/2011/nr/c1nr10182j

6. T. Huang, L. M. Browning, **X. Xu***, "Far-field photostable optical nanoscopy (PHOTON) for real-time super-resolution single-molecular imaging of signaling pathways of single live cells" *Nanoscale* 4, 2797-2812 (2012); https://pubs.rsc.org/en/content/articlepdf/2012/nr/c2nr11739h

7. **X. Xu***, "Far-field photostable optical nanoscopy", in *Encyclopedia of Spectroscopy and Spectrometry*, 3rd Ed., J. C. Lindon, G. Tranter and D. W. Koppenaal, Eds. Elsevier, vol. 1, 566-570 (2017) https://doi.org/10.1016/B978-0-12-409547-2.12143-2

8. P. Songkiatisak, P. Cherukui, **X. Xu***, "PHOTON for sensing and imaging of rare subsets of single brain cancer stem cells", (in preparation)

II. Innovations in Plasmonic Nanoparticle Sensors for Probing Multidrug Resistance in Live Cells

Dr. Xu has pioneered the development and application of photostable, multicolored plasmonic nanoparticles as nanometer-sized sensors to image dynamic biological events, particularly the size-dependent efflux functions of multidrug membrane transporters in single live cells. Her group has demonstrated that the plasmonic optical properties (localized surface plasmon resonance, LSPR spectra) of individual nanoparticles can serve as nanometer-scale probes to monitor real-time conformational and functional changes of membrane transporters in single live cells, using dark-field optical microscopy and spectroscopy.

Dr. Xu has employed these highly innovative tools to investigate the molecular mechanisms of multidrug resistance (MDR) and has shown that engineered nanoparticles can act as drug carriers to enhance therapeutic efficacy and exert size-dependent inhibitory effects against highly infectious bacteria.

Key discoveries include the creation of super-bright and photostable (non-bleaching, non-blinking) single plasmonic nanoparticles; the characterization of size-dependent efflux functions; the elucidation of dynamic and chemical sensing capabilities of membrane transporters; and the demonstration of how nanoparticle drug carriers can overcome MDR, offering more effective treatment options with reduced side effects.

Selected papers include:

1. **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**, 175-182 (2002). (To our knowledge, this is the first paper ever using single plasmonic nanoparticles to image single membrane transporters of single live cells at nm scale in real-time); https://pubs.acs.org/doi/pdf/10.1021/nl015682i
2. **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); https://pubs.acs.org/doi/pdf/10.1021/bi036231a

3. 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); https://pubs.acs.org/doi/pdf/10.1021/bi0351110
4. P. Nallathamby, K. Lee, T. Desai, **X. Xu***, "Study of multidrug membrane transporters of single living *Pseudomonas aeruginosa* cells using size-dependent plasmonic nanoparticle optical probes", *Biochemistry* **49**, 5942-5953 (2010); https://pubs.acs.org/doi/pdf/10.1021/bi100268k
5. F. Ding, K. Lee, A. Vahedi-Faridi, T. Huang, **X. Xu***, "Design and probing of efflux functions of EGFP fused ABC membrane transporters in live cells using fluorescence spectroscopy", *Anal. Bioanal. Chem.* **400**, 223-235 (2011).https://link.springer.com/content/pdf/10.1007%2Fs00216-011-4727-7.pdf
6. F. Ding, K. Lee, A. Vahedi-Faridi, H. Yoneyama, C. Osgood, **X. Xu***, "Design and study of efflux function of EGFP fused MexAB-OprM membrane transporter in *Pseudomonas aeruginosa* using fluorescence spectroscopy" *Analyst* **139**, 3068-3096 (2014). https://pubs.rsc.org/en/content/articlepdf/2014/an/c4an00108g
7. L. Browning, K. Lee, P. Nallathamby, P. Cherukui, T. Huang, S. Warren, **X. Xu***, "Single nanoparticle plasmonic spectroscopy for study of charge-dependent efflux function of multidrug ABC membrane transporters of single live *Bacillus subtilis* cells", *J. Phys. Chem. C.* **120**, 21007-21016 (2016); https://pubs.acs.org/doi/pdf/10.1021/acs.jpcc.6b03313
8. L. Browning, K. Lee, P. Cherukuri, T. Huang, S. Warren, **X. Xu***, "Single gold nanoparticle plasmonic spectroscopy for study of chemical-dependent efflux function of single ABC membrane transporters of single live *Bacillus subtilis* cells", *Analyst* **143**, 1599-1608 (2018); https://pubs.rsc.org/en/content/articlepdf/2018/an/c7an01787a
9. F. Ding, P. Cherukui, P. Songkiatisak, T. Huang, **X. Xu***, "Size-dependent inhibitory effects of antibiotics drug nanocarriers against *Pseudomonas aeruginosa*", *ACS Omega* **3**, 1231-1243 (2018); https://pubs.acs.org/doi/pdf/10.1021/acsomega.7b01956
10. P. Cherukui, P. Songkiatisak, F. Ding, JM Jault, **X. Xu***, "Antibiotic drug nanocarriers for probing of multidrug ABC membrane transporter of *Bacillus subtilis", ACS Omega* **5**, 1625-1633 (2020); https://pubs.acs.org/doi/pdf/10.1021/acsomega.9b03698
11. P. Songkiatisak, F. Ding, P. Cherukui, **X. Xu***, "Study of size-dependent inhibitory effects of antibiotics drug nanocarriers against *E. Coli*", *Nanoscale Advances* **2**, 2135-2145 (2020); https://pubs.rsc.org/no/content/articlehtml/2020/na/c9na00697d

III. Precision Engineering and Real-Time Imaging of Noble Metal Nanoparticles in Living Systems

Dr. Xu has synthesized, purified, and characterized noble metal nanoparticles with precisely controlled sizes, shapes, and surface chemistries. She has developed single nanoparticle optical microscopy and spectroscopy techniques to characterize the size and optical properties of individual nanoparticles using their localized surface plasmon resonance (LSPR) spectra. Additionally, she pioneered the development of single nanoparticle optical rulers to measure the size and shape of plasmonic nanoparticles in solution, in single live cells, and in developing embryos—***in situ*** and in real time.

These innovative imaging and spectroscopic tools enable the rational design and application of noble metal nanoparticles for dynamic imaging of single live cells and developing embryos. Her team was the first to image embryonic development and map nano-environments and fluid dynamics in vivo with nanometer spatial resolution in real time.

Key discoveries include the tunable, rainbow-colored plasmonic optical properties and biological effects of noble metal nanoparticles, along with their unique and transformative applications in biology and medicine.

Selected papers include:

1. K. Lee, P. Nallathamby, L. Browning, C. Osgood, **X. Xu***, "*In vivo* imaging of transport and biocompatibility of single nanoparticles in the early development of zebrafish embryos", *ACS Nano,* **1**, 133-143 (2007). (To our knowledge, this is the first time ever that zebrafish embryos were used to study toxicity and biocompatibility of nanomaterials, and the plasmonic nanoparticle optical imaging probes were used to study dynamics and transport of the developing embryos in real time at nanometer resolution; https://pubs.acs.org/doi/pdf/10.1021/nn700048y
2. P. Nallathamby, K. Lee, **X. Xu***, "Design of stable and uniform single nanoparticle photonics for *in vivo* dynamics imaging of nano environments of zebrafish embryonic fluids", *ACS Nano*, **2**, 1371-1380 (2008); https://pubs.acs.org/doi/pdf/10.1021/nn800048x
3. L. Browning, K. Lee, T. Huang, P. 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); https://pubs.rsc.org/en/content/articlepdf/2009/nr/b9nr00053d
4. T. Huang, **X. Xu***, "Synthesis and characterization of tunable rainbow-colored silver nanoparticle solutions using single-nanoparticle plasmonic microscopy and spectroscopy", *J. Material Chemistry* **20**, 9867-9876 (2010) (Journal back-cover highlight); https://pubs.rsc.org/en/content/articlepdf/2010/jm/c0jm01990a
5. P. Nallathamby, T. Huang, **X. Xu***, "Design and characterization of optical nano rulers of single nanoparticles using optical microscopy and spectroscopy", *Nanoscale* 2, 1715-1722 (2010); https://pubs.rsc.org/en/content/articlepdf/2010/nr/c0nr00303d

IV. Nanomedicine and Therapeutic Design: Advancing Nanotoxicology and Biocompatibility for Precision Medicine

Dr. Xu has designed, synthesized, and characterized a mini library of purified, stable (non-aggregated) silver and gold nanoparticles with precisely controlled sizes and surface functional groups. She has employed these well-defined nanoparticles as a model system to investigate the effects of nanomaterials on living organisms. Dr. Xu pioneered the development of ***vivo*** assays using zebrafish embryos to study how the biocompatibility and toxicity of nanomaterials depend on their physicochemical properties. Her goal is to rationally design ultrasensitive ***in vivo*** assays for nanotoxicity assessment and to develop biocompatible nanomaterials for use in drug delivery, imaging, and implantable medical devices.

She published the first research article on this subject and has since conducted a series of systematic studies examining how nanoparticle size, surface charge, and composition influence embryonic development (see Section III-1 above).

Her discoveries include:

- The unique biological effects of nanomaterials,
- The tunability of their toxicity and biocompatibility based on physical and chemical properties, and
- The potential for the rational design of nanomaterials tailored for specific biomedical applications such as imaging, drug delivery, and implant devices.

Selected papers include:

1. K. Lee, L. Browning, P. Nallathamby, T. Desai, P. Cherukuri, **X. Xu***, "*In vivo* quantitative study of size-dependent transport and toxicity of single silver nanoparticles using zebrafish embryos" *Chem. Res. Toxico.* **25**, 1029-1046 (2012); https://pubs.acs.org/doi/pdf/10.1021/tx300021u
2. K. Lee, P. Nallathamby, D. Tanvi, L. Browning, P. Cherukuri, **X. Xu***, "Single nanoparticle spectroscopy for real-time *in vivo* quantitative analysis of transport and toxicity of single nanoparticles in single embryos" *Analyst* **137**, 2973-2986 (2012); https://pubs.rsc.org/en/content/articlepdf/2012/an/c2an35293a
3. L. Browning, T. Huang, X. Xu*, "Real-Time *in vivo* imaging of size-dependent transport and toxicity of gold nanoparticles in zebrafish embryos using single nanoparticle plasmonic spectroscopy", *Interface Focus* 3, 20120098 (2013); http://rsfs.royalsocietypublishing.org/content/royfocus/3/3/20120098.full.pdf
4. K. Lee, L. Browning, P. Nallathamby, C. Osgood, **X. Xu***, "Silver nanoparticles induce developmental stage-specific embryonic phenotypes in zebrafish" *Nanoscale* **5**, 11625-11636 (2013). (Journal Front-cover highlight); https://pubs.rsc.org/en/content/articlepdf/2013/nr/c3nr03210h
5. L. Browning, K. Lee, P. Nallathamby, **X. Xu***, "Silver nanoparticles incite size and dose-dependent developmental phenotypes and nanotoxicity in zebrafish embryos" *Chem. Res. Toxico.* **26**, 1503-1513 (2013); https://pubs.acs.org/doi/pdf/10.1021/tx400228p
6. K. Lee, L. Browning, P. Nallathamby, **X. Xu***, "Study of charge-dependent transport and toxicity of peptide-functionalized silver nanoparticles using zebrafish embryos and single nanoparticle plasmonic spectroscopy" *Chem. Res. Toxico.* **26**, 904-917 (2013); https://pubs.acs.org/doi/pdf/10.1021/tx400087d
7. M. Johnson, P. Songkiatisak, P. Cherukui, **X. Xu***, "Toxic effects of silver ions on early-developing zebrafish embryos distinguish from silver nanoparticles", *ACS Omega* 7, 4046-4055 (2022); https://pubs.acs.org/doi/full/10.1021/acsomega.2c05504

V. High-Throughput Optical Characterization of Nanoparticle Arrays:

Dr. Xu has designed a high-throughput single-nanoparticle dark-field optical microscopy and spectroscopy (DFOMS) platform to characterize the physicochemical-dependent optical properties of single-nanoparticle arrays fabricated via electron-beam (E-beam) lithography, *in situ* and in real time.

Selected papers include:

1. T. Huang, **X. Xu***, "Synthesis and characterization of tunable rainbow colored silver nanoparticle solutions using single-nanoparticle plasmonic microscopy and spectroscopy", *J. Material Chemistry* **20**, 9867-9876 (2010); https://pubs.rsc.org/en/content/articlepdf/2010/jm/c0jm01990a
2. P. Nallathamby, T. Huang, **X. Xu***, "Design and characterization of optical nano rulers of single nanoparticles using optical microscopy and spectroscopy", *Nanoscale* 2, 1715-1722 (2010) (RSC journal: IF = 8.307; Citation = 47); https://pubs.rsc.org/en/content/articlepdf/2010/nr/c0nr00303d
3. Y. Song, P. Nallathamby, T. Huang, H. Elsayled-Ali, **X. Xu***, "Correlation and characterization of three-dimensional morphologically dependent localized surface plasmon resonance spectra of single silver nanoparticles using dark-field optical microscopy and spectroscopy and atomic force microscopy", *J. Phys. Chem. C.* 114, 74-81 (2010); https://pubs.acs.org/doi/pdf/10.1021/jp9083019
4. W. Cao, T. Huang, **X. Xu**, H. Elsayled-Ali, "Localized surface plasmon resonance of single silver nanoparticles studied by dark-field optical microscopy and Spectroscopy", *J. App. Phys.* **109**, 034310 (2011); https://aip.scitation.org/doi/pdf/10.1063/1.3544349?class=pdf
5. T. Huang, W. Cao, H. Elsayled-Ali, **X. Xu***, "High-throughput ultrasensitive characterization of chemical, structural and plasmonic properties of EBL-fabricated single silver nanoparticles" *Nanoscale* 4, 380-385 (2012); https://pubs.rsc.org/en/content/articlepdf/2012/nr/c1nr11368b

6. **X. Xu***, "Far-field photostable optical nanoscopy", in *Encyclopedia of Spectroscopy and Spectrometry*, 3rd Ed., J. C. Lindon, G. Tranter and D. W. Koppenaal, Eds. Elsevier, vol. 1, 566-570 (2017) (Elsevier publication: **invited & peer-reviewed Chapter**); https://doi.org/10.1016/B978-0-12-409547-2.12143-2

VI. Pioneering Ultrafast Electric Pulses for Stem Cell Engineering

Dr. Xu has pioneered the use of ultrashort (10-nanosecond) electric pulses as a novel bioelectric approach to prepare feeder cells and control the culture and differentiation of embryonic stem cells (ESCs). She developed single-cell micro-electric devices integrated with high-resolution imaging platforms, enabling real-time visualization of electric pulse effects on intracellular structures and functions in live cells. This breakthrough makes it possible, for the first time, to directly observe and manipulate cellular behavior at the single-cell level using precisely tuned electric fields. Her discoveries offer transformative tools for stem cell engineering, regenerative medicine, and the study of intracellular dynamics. Selected papers are those listed in (I) and below:

1. L. Browning, T. Huang, **X. Xu***, "Electric pulses to prepare feeder cells for sustaining and culturing of undifferentiated embryonic stem cells", *Biotechnol. J.* **5**, 588-592 (2010); https://onlinelibrary.wiley.com/doi/epdf/10.1002/biot.201000040

2. 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). https://pubs.acs.org/doi/pdf/10.1021/jp9021739

3. X. Xu*, L. Browning, "New Green Methods for Culture of Embryonic Stem Cells". Provision US Patent App. 61/293,526.

4. L. Browning, E. Perez V, F. Ding, T. Huang, **X. Xu***, "Pulsed electric fields for study of undifferentiated and differentiated embryonic stem cells into functional cardiomyocytes", (in preparation).

VII. Pioneering Innovations in Single-Molecule Detection and Ultrasensitive Bioanalysis

Dr. Xu has played a transformative role in advancing and popularizing single-molecule detection and ultrasensitive bioanalysis for applications in biology and medicine. She is among the early pioneers who designed and implemented total internal reflection fluorescence microscopy (TIRFM) for single-molecule detection. Dr. Xu was the first to demonstrate real-time, continuous imaging of single molecules in free solution, successfully measuring the photobleaching lifetimes and diffusion behaviors of individual fluorophores. Her groundbreaking work led to the discovery of long-range electrostatic trapping of single protein molecules at the liquid–solid interface—an insight she published in two landmark papers in *Science*. TIRFM has since been commercialized and is now widely used in research laboratories worldwide as an inexpensive, accessible, and powerful imaging tool to study single molecules in solution, living systems, and at interfaces.

Over the past decades, Dr. Xu has continued her pioneering work by developing photostable optical nanoparticle probes, single-molecule optical nanosensors, and imaging platforms capable of studying single live cells and embryos at molecular resolution (see Sections I–VI). She has also actively promoted the field by organizing high-profile symposia at major national and international conferences and advocating for increased funding from agencies such as the NIH and NSF. Thanks in part to her leadership, single-molecule detection has become a mainstream and essential tool in biomedical research.

In parallel, Dr. Xu has made major contributions to electrochemiluminescence (ECL)-based bioanalysis for clinical diagnostics. Her innovations in ECL assays helped establish them as the global gold standard for biomarker detection and disease diagnostics. Notably, she pioneered the development of ECL-based DNA biosensors, combining surface chemistry and thin-film methodologies to immobilize single DNA strands and

detect them with ultrasensitive ECL readouts. This breakthrough, for which she held a global patent, preceded the development of DNA microarrays and laid foundational groundwork for modern genomic diagnostics.

Selected papers include:

1. **X. Xu**, E. S. Yeung, "Long-range electrostatic trapping of single protein molecules at a liquid/solid interface", *Science*, **281**, 1650-1653 (1998); http://science.sciencemag.org/content/sci/281/5383/1650.full.pdf
2. **X. Xu**, E. S. Yeung, "Direct measurement of single-molecule diffusion and photodecomposition in free solution", *Science*, **275**, 1106-1109 (1997); http://science.sciencemag.org/content/sci/275/5303/1106.full.pdf
3. A. J. Bard and **X. Xu**, "Biosensor for and Method of Electrogenerated Chemiluminescent Detection of Nucleic Acid Adsorbed to a Solid Surface", Worldwide Patent. World Intellectual Property Organization No. WO9606946A1 (issued 03/07/1996); Australian Patent No. 703344 (sealed 08/07/1999).
4. **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**, 2627-2631 (1995); https://pubs.acs.org/doi/pdf/10.1021/ja00114a027
5. **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**, 8386-8387 (1994); https://pubs.acs.org/doi/pdf/10.1021/ja00097a064
6. **X. Xu***, R. Jeffers, J. Gao, "Novel solution-phase immunoassays for molecular analysis of tumor markers", *The Analyst*, **126**, 1285-1292 (2001) https://pubs.rsc.org/en/content/articlepdf/2001/an/b104180k
7. **X. Xu***, Z. Wen, W. Brownlow, "Ultrasensitive analysis of binding affinity of HIV receptor and neutralizing antibody using solution-phase electrochemiluminescence assay" *J. Electroanal. Chem.* **688**, 53-60 (2013); [Link]

VIII. Pioneering Study of Electrochemistry and Metal Deposition in Room-Temperature Chloroaluminate Molten Salts

Dr. Xu has made significant contributions to advancing electrochemistry and metal deposition in room-temperature chloroaluminate molten salts (ionic liquids). She developed and demonstrated new methods for studying metal deposition in these systems and elucidated the first nucleation mechanism of metal deposition in room-temperature chloroaluminate melts. She also reported the first successful electrodeposition of two metals from both acidic and basic melts.

Selected papers include:

1. **X. Xu**, C. L. Hussey, "The electrochemistry of tin from aluminum chloride-1-methyl-3-ethylimidazolium chloride molten salt", *J. Electrochem. Soc.*, **140**, 618-626 (1993); http://jes.ecsdl.org/content/140/3/618.full.pdf+html
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", *J. Electrochem. Soc.*, **140**, 1226-1233 (1993); http://jes.ecsdl.org/content/140/5/1226.full.pdf+html
3. **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**, 1295-1300 (1992); http://jes.ecsdl.org/content/139/5/1295.full.pdf+html
4. **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); http://jes.ecsdl.org/content/139/11/3103.full.pdf+html

5. **X. Xu**, C. L. Hussey, "Electrodeposition of metals from room-temperature chloroaluminate molten salts", *Proc. of Electrochem. Soc.,* **16**, 445 (1992); http://ecst.ecsdl.org/content/ecstpv/1992-16/445.full.pdf+html

6. C. L. Hussey, **X. Xu**, "Electrodissolution and electrodeposition of lead in an acidic room-temperature chloroaluminate molten salt", *J. Electrochem. Soc*., **138**, 1886-1890 (1991); http://jes.ecsdl.org/content/138/7/1886.full.pdf+html

Selected Peer-Reviewed Publications:

(Original Research peer-reviewed publications: Total citations = 6215; h-index = 38; i10-index = 59; citation number on 8/2026 is listed below; See http://scholar.google.com/citations?user=4a4OTm0AAAAJ for updated citations; Top 5-6% citations in Nano & Anal. Chem. Fields; Top Scholar-Lifetime 0.5% in silver nanoparticle)

75. P. Nallathamby, P. Cherukui, **X. Xu***,"Single nanoparticle imaging probes for probing multidrug resistance of ovarian tumor cells", (in preparation)
74. P. Nallathamby, T. Huang, X. Xu*, "Spatio-temporal resolved super-resolution microscopy for real-time imaging of membrane transport of single *Pseudomonas aeruginosa* cells" (in preparation)
73. T. Huang, P. Nallathamby **X. Xu***, "Real-time probing electromagnetic hotspots on single nanoparticle using single molecule surface enhanced Raman spectroscopy" (in preparation)
72. T. Huang, K. Lee, **X. Xu***, "Multi-spectroscopy super-resolution microscopy for real-time imaging of transport mechanism of single ABC membrane transporters in single live cells" (in preparation)
71. P. Songkiatisak, P. Cherukui, **X. Xu***, "PHOTON for sensing and imaging of rare subsets of single brain cancer stem cells in tissues", (in preparation)
70. T. Huang, **X. Xu***, "Design and characterization of photostable single CD133 molecule nanoparticle optical biosensors for imaging single live cancer stem cells" *J. Am. Chem. Soc.* (ACS Journal: IF = 16.383; in preparation)
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Selected Presentations

202. **X. Xu***, "Real-time single molecular imaging of single live cells for biomedical applications", Pittcon 2026, San Antonio, TX. (**Invited**)
201. **X. Xu***, "Innovative nanobiotechnology for probing multidrug membrane transporters in single live cells", ACS National Meeting Fall 2025, Washington DC (**invited**).

200. **X. Xu***, "Innovative Nanobiotechnology for Biomedical Breakthrough", Global Conference on Biomedical Engineering 2025, (**Invited Plenary Lecture**)

199. **X. Xu***, "Innovative Nanobiotechnology for Biomarker Discovery", Pittcon 2025, Boston, MA. (**Invited**)

198. **X. Xu***, "Single Plasmonic Nanoparticles for Probing Multidrug Membrane Transporters in Single Live Cells", NanoBioTech, Norfolk, VA. (**Invited**)

197. **X. Xu***, "New nanobiotechnology for biomedical innovation", Nanotechnology 2024, Edinburgh, Scotland, Aug. 29-31, 2024 (**Invited Plenary Lecture**)

196. **X. Xu***, M. Johnson, P. Songkiatisak P. Cherukuri, "Real-time spectroscopic probing of surface-dependent biocompatibility and toxicity of nanoparticles", ACS National Meeting Fall 2024, Deven, CO (**invited**).

195. **X. Xu***, "Real-time probing of effects of single nanoparticles on single tumor cells", Unite Scientific Chemistry Conference, Munich, Germany, July 18-19, 2024 (**Invited Keynote**).

194. **X. Xu***, "Single nanoparticle molecular sensors for imaging of single live cells", Future of Biosensors and Bioelectronics, June 21, 2024 (**Invited Keynote**)

193. **X. Xu***, "Innovative NanoBiotechnology for Biomedical Breakthroughs", NanoBioTech, VA Beach, Virginia, April 25-26, 2024 (**Invited Plenary Lecture**)

192. **X. Xu***, "Single nanoparticle optics for real-time single molecule sensing and imaging of single live cells", 2023 International Conference on Nano Research and Development, Singapore (**Invited Plenary Lecture**)

191. **X. Xu***, "New nanobiotechnology for real-time imaging of single live cells", 2023 World Nanotechnology Conference, Orlando, FL (**Invited Keynote**)

190. **X. Xu***, P. Songkiatisak, P. K. Cherukui, M. Johnson, "Design of biocompatible nanoparticles for probing living cellular functions", 2022 NSF Nanoscale Science and Engineering Grantees, NSF, Washington, DC.

189. **X. Xu***, M. Johnson, P. Songkiatisak, "New sensing and imaging tools for dynamic probing of brain development *in vivo*", 8th Annual BRAIN Initiative Meeting 2022, NIH, Washington, DC.

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. (My student, RR, presented this paper)

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", 4th 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", 3rd 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", 3rd 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", 252nd 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", 3rd 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", 250th 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 15th 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. Cherukuri, **"**Single nanoparticle spectroscopy for quantitative analysis of nanotoxicity", Pittcon'2013, Philadelphia, PA.

137. **X. Xu***, T. Huang, L. 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. 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. 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", 242nd 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", 242nd 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 242nd ACS National Meeting 2011, Denver, CO.

127. **X. Xu***, K. Lee, L. Browning, P. Nallathamby, "Design of *in vivo* assays for probing of physicochemical dependent biocompatibility and toxicity of nanomaterials", The 242nd 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", 204th ACS National Meeting (Boston, 08/2010) (**invited**).

119. **X. Xu***, T. Huang, P. Nallathamby, "Photostable single molecule nanoparticle optical biosensors for sensing and imaging of single protein molecules and their binding kinetics", The 204th 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", 237th 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 236th 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 236th 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. 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", 234th 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", 232th 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", 230th 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", 230th ACS National Meeting (DC, 2005) (**invited**).

86. P. 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. 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. 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 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 nanoprobes"**,** 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, "Electrochemilumiescence 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 electro-chemiluminescence", 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 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***, "Ultrasensitive analysis of HIV receptors and neutralizing antibodies using electrochemiluminescence″, 1999 Virginia Academy of Science.

32. Z. Wen, B. Logan, R. Jeffers, **X. Xu***, "Electrochemiluminescence study of the interaction of biomolecules″, 1999 Virginia Academy of Science.

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

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

29. **X. Xu***, 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***, 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 $Ru(bpy)_3^{2+}$ and $Ru(dp\text{-}bpy)_3^{2+}$ 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:

89. **X. Xu***, "Single-Molecule Nanoparticle Optical Sensors for Biomedical Applications", Center of Bioelectronics, ODU (2025) (**invited**).

88. **X. Xu***, "Advanced Quantum/Nanomaterials and Innovative NanoBiotechnology for Biomedical Breakthroughs", Case Western Reserve University (2024) (**invited**).

87. **X. Xu***, "Innovative NanoBiotechnology for Biomedical Breakthroughs" Indiana University (2024) (**invited**)

86. **X. Xu***, "Innovative NanoBiotechnology for Biomedical Applications", University of Nevada (2024) (**invited**).

85. **X. Xu***, "New NanoBiotechnology for Biomedical Innovations", Texas A&M University (2023) (**invited**).

84. **X. Xu***, "New NanoBiotechnology for Biomedical Innovations", University of Arizona (2023) (**invited**).

83. **X. Xu***, "New NanoBiotechnology for Biomedical Innovations", Tufts University (2023) (**invited**).

82. **X. Xu***, "New NanoBiotechnology for Real-time Imaging of Single Live Cells", University of Kentucky (2023) (**invited**).

81. **X. Xu***, "New NanoBiotechnology for Biomedical Innovations", Center of Bioelectronics, ODU (2023) (**invited**).

80. **X. Xu***, "Innovative Sensing and Imaging Tools for Biomedical Applications", Texas A&M University (2022) (**invited**).

79. **X. Xu***, "New NanoBiotechnology for Sensing and Imaging of Single Live Cells: From Fundamental Discoveries to Biomedical Innovations", Purdue University (2022) (**invited**).

78. **X. Xu***, "New NanoBioPhotonics for Biomedical Engineering Innovations", Arizona State University (2022) (**invited**).

77. **X. Xu***, "New NanoBioPhotonics for Innovative Biomedical Applications", Northeastern University (2021) (**invited**).

76. **X. Xu***, "New Tools for Biomedical Innovations and Applications", University of Alabama (2021) (**invited**).

75. **X. Xu***, "NanoBioPhotonics: Innovations & Applications", University of Louisville (2021) (**invited**).

74. **X. Xu***, "NanoBiotechnology for Biomedical Innovations and Applications", Howard University (2021) (**invited**).

73. **X. Xu***, "New Nano Tools for Real-Time Imaging of Single Live Cells: From Fundamental Discoveries to Biomedical Engineering Applications", Umass Amherst (2020) (**invited**).

72. **X. Xu***, "New Nano Tools for Following Single Live Cells: From Fundamental Discoveries to Transformative Engineering Applications", Washington University (2020) (**invited**).

71. **X. Xu***, "New Nano Tools for Real-time Single Molecule Imaging of Single Live Cells: From Fundamental Discoveries to Transformative Engineering", University of Illinois (2020) (**invited**).

70. **X. Xu***, "New Nano Tools for Following Single Live Cells: From Fundamental Discoveries to Biomedical Applications", Texas Tech University (2020) (**invited**).

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", 1st 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", 1st 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 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, UT-Austin, TX (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).

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 (03/2019-03/2020)
- Dr. Pon Songkiatisak (06/2018-03/2020)
- Dr. Pavan Cherukui (2016-2017)
- Dr. Lauren Browning (2014)
- Dr. Tao Huang (2006-2008: postdoc; 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

- Martha Johnson (PhD conferred 05/2019) (postdoc at UNC-Chapel Hill)
- Pon Songkiatisak (PhD conferred 05/2018) (postdoc at NIH)
- Pavan Cherukuri (PhD conferred 12/2016) (postdoc at USF)
- Lauren Browning (PhD conferred 12/2013) (Associate Research Director at Alliance Pharma)
- Feng Ding (PhD conferred 12/2013) (Assistant Professor at Wenzhou Medical School)
- Kerry Lee (PhD conferred 05/2012) (Tenured Associate Professor at Florida Gulf Coast University)
- Prakash Nallathamby (PhD conferred in 05/2010) (Assistant Prof. University of Notre Dame, Associate Director of Research at the Advanced Diagnostics and Therapeutics Center)
- 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.; Project Manager at Delorbis Pharmaceuticals)
- 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, Sr. Research Scientist at Merck)

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

- Regan Allen (2018-2019)
- Andrea Zourou (2017-2019)
- Ashley Coffell (2018) (Class 2018) (Pursue PhD in genetics at Texas A&M)
- Elton Sykes (2017-2018)
- Briana Gallagher (2017)
- Priscilla Prem (2015-2016) (Class 2017) (Pursue PhD in Chemistry at Pitt.)
- Alice Gabrielov (2014-2016) (Class 2016) (Pursue PhD in Biomedical Engineering at UNC-Chapel Hill)
- 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) (MD)
- Clint-Jomar Bruno (2011-2012) (Class 2014) (MD)
- Kaleigh V. Wiley (2011) (outstanding graduate senior, BS in biochemistry) (Class 2014) (MD)
- Epi Perez (2009-2011) (Class 2012)
- Kevin Kircheval (2010-2012) (Class 2012) (PhD in toxicology, Univ. of Florida, 05/2017)
- Jill Lowman (2006-2009) (Class 2009) (PharmD/MBA/BCPS, Johns Hopkins Bayview Medical Center)
- 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) (MD, Geriatrician, Boston Medical Center)
- 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 Ohlhaver (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:

- 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:

- 2026: Invited external committee member, University of Alberta
- 2025-present: Erem Ujah (PhD student in ECE/BME)

- 2025-2026: Reagan Aviha (PhD student in ECE/BME, conferred 05/2026)
- 2022-2025: Alex Hunt (PhD student in ECE/BME, conferred 05/2025)
- 2022-2025: Chris Animashaun (PhD student in ECE/BME, conferred 05/2025)
- 2020-2022: Saikat Banerjee (PhD student in ECE/BME, conferred 08/2022)
- 2019-2020: Ankit Bhanudas (PhD student in ECE/BME, conferred 08/2020)
- 2017-2020: Dan Wang (PhD student in Chemistry, conferred 08/2020)
- 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)

Selected Notable Students:

- Dr. Khalid Salaita (Class 2001) (Tenured Full Professor, Emory Univ.)
- Dr. Vassiliki Pravodelov (Class 2007) (MD, Geriatrician, Boston Medical Center)
- Dr. Jill Lowman (Class 2009) (PharmD/MBA/BCPS, Johns Hopkins Medical Center)
- Dr. Seth Warren (Class 2014) (MD, EVMS)
- Dr. Prakash Nallathamby (PhD, 05/2010) (Associate Director of Research at the Advanced Diagnostics and Therapeutics Center, University of Notre Dame)
- Dr. Tanvi Desai (MS in Biotech, 2008) (PhD, Rice, 2014; Sr. Scientist, Merck)
- Dr. Sophia Kyriacou (MS in Chemistry, 2003) (PhD, Univ. of Miami; Project Manager, Delorbis Pharmaceuticals)
- Dr. Kerry Lee (PhD, 05/2012) (Tenured Associate Professor, Florida Gulf Coast Univ.)
- Dr. Feng Ding (PhD, 12/2013) (Assistant Professor, Wenzhou Medical School)
- Dr. Lauren Browning (PhD, 12/2013) (Associate Director, Alliance Pharma)
- Dr. Pavan Cherukuri (PhD, 12/2016) (Research Staff, USF)
- Dr. Pon Songkiatisak (PhD, 05/2018) (Postdoc, NIH)
- Dr. Martha Johnson (PhD, 05/2019) (Postdoc, UNC-Chapel Hill)

Teaching

Developed **4 new courses,** Reconstructed **2 courses,** and Taught **26 different** courses given below:

Taught **14 different** graduate courses given below

- 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)
- Frontiers in Nanoscience and Nanotechnology (Chem/Bio/ECE 560: **new course**, 2009-)
- Instrumental Analysis (Chem 708)
- Physical Biochemistry (Chem 775)
- Master Research (Chem 698) and Thesis (Chem 699)
- Doctoral Research (Chem 898)
- Doctoral Dissertation (Chem 899)

Taught **12 different** undergraduate courses listed below:

- Analytical Chemistry Lecture (Chem 321)
- Analytical Chemistry Laboratory (Chem 322)
- Accelerated General Chemistry Lab (Chemistry 138, Direct Research Portion)
- **Biomedical Engineering II: Applications (BME 401) (team-taught)**
- **Neurotechnology (Chem 175T)**
- Frontiers in Nanoscience and Nanotechnology (Chem/Bio/ECE 460: **new course,** 2009-)
- Instrumental Analysis (Chem 422)
- College Chemistry (Chem 102 N)
- Introductory Chemistry (Chem 105N)
- Introductory Organic and Biochemistry (Chem 107N)
- Foundations of Chemistry Lecture (Chem 121N)
- Thermodynamics and Kinetics, Nanjing Univ. of Chemical Engineering & Technology (1985-1987)

- Active faculty member in interdisciplinary Ph.D. program in Biomedical Sciences: 1998-present
- Faculty member in PhD program in Biomedical Engineering: 2012-present
- Director of graduates and undergraduates for their laboratory training and thesis research
- Member of dissertation committee for students in the Departments of Biochemistry, Biomedical Sciences, Biomedical Engineering, Chemistry, and Physic.

Department, University and Virginia State Committee Services & Leadership

2019-2021: Member of Advisory Board, Frank Reidy Research Center for Bioelectrics
2018-2021: Group coordinator/leader of the Virginia Neuroscience Initiative
2009-present: Department full professor promotion committee
2004-present: Department tenure and promotion committee
1998-2020: Graduate student committee in chemistry/biochemistry: actively recruit students.
2020-2026: Undergraduate student committee in chemistry/biochemistry: actively recruiting students.
2010: Full professor promotion committee of the 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 the executive committee of the program: actively led and recruited excellent students and increased the enrollment and productivity of graduate students; led and developed curricula; actively recruited and encouraged faculty members to participate in this interdisciplinary program. This track continues to be thrilling, despite many reconstructions over the years.
2000-2018: Faculty search committees: help to recruit excellent new faculty members.
2000: Departmental representative and organizer of the 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 online journals.
1999-2004: Technology committee: actively promoted website development and multi-media presentation.

Selected Professional Societies, Leadership, and Services

- American Chemical Society (ACS), 1990-present
  - Elected ACS Fellow, 2026, recognizing her pioneering advances in single-molecule detection, nanobiotechnology, and ultrasensitive bioanalysis, and her visionary leadership and dedicated service to ACS.
  - **Alternate Councilor and Member of the Executive Committee**, ACS Division of Analytical Chemistry, 2016–2021; elected in 2015 and re-elected in 2018.
  - **Associate**, ACS Joint Board–Council Committee on Publications, 2018, contributing to ACS-wide publication and governance activities.
  - **Member**, ACS Award Review Committee, 2012–2014 and 2020–present.
- American Association for the Advancement of Sciences (AAAS) (1996-present)
  - Elected AAAS Fellow, 2011, recognizing her distinguished contributions to the fields of nanobiotechnology and ultrasensitive bioanalysis, including single nanoparticle optics, nanobiosensors, single molecule detection, and single live cell imaging.
  - **Member**, AAAS Awards Review Committee, 2021–2023, contributing to the evaluation of candidates for prestigious national scientific honors.
  - **Reviewer**, invited symposium proposals for the AAAS Annual Meeting, helping shape the scientific program of one of the nation's leading multidisciplinary scientific organizations.
- American Institute for Medical and Biological Engineering (AIMBE) Fellow (2026-present), recognizing for pioneering sensing and imaging platforms, enabling real-time, multiplexed, single-molecule analysis of living cells.
- Society of Neuroscience (2017-present)
- Active Member of Electrochemical Society (1991-2004)