

Brian T. Cunningham

Intel Alumni Endowed Chair Professor

Professor of Electrical & Computer Engineering, Professor of Bioengineering
Director, Center for Genomic Diagnostics, University of Illinois at Urbana-Champaign

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Summary:

Prof. Cunningham completed his Ph.D. at the University of Illinois at Urbana-Champaign in May 1990. From 1990-1991, he was a postdoctorate scientist at Sandia National Laboratory in the compound semiconductor research group, where he contributed to the development of epitaxial crystal growth methods for InAsSb strained layer superlattices for infrared photodiode sensor applications. He joined the Research Division of Raytheon, in Lexington, MA from 1991-1995, where he was the Group Leader for Infrared Sensors Fabrication with responsibility for process development of HgCdTe focal plane arrays, microbolometer sensor arrays, and heterogeneous integration of sensors with readout electronics with applications that included night vision and heat-seeking missile systems. He joined the Micromachined Sensors Group at the Charles Stark Draper Laboratory in Cambridge, MA in 1995 as a senior member of the technical staff, where he later served in management roles that included Group Leader for MEMS Sensors, and Technical Director for Bioengineering Programs. At Draper Laboratory, Dr. Cunningham initiated efforts in biosensors, microfluidics, and tissue engineering through his own efforts, recruitment of Draper engineers to new topics, and establishment of research partnerships with leading clinical researchers at Harvard Medical School and Massachusetts General Hospital that were institutionalized through the Center for Integration of Medicine and Innovative Technology (CIMIT). Biomedical research programs established by Dr. Cunningham at Draper Laboratory continue to this day. At Draper Laboratory, Dr. Cunningham's research accomplishments included development of integrated arrays of flexural plate wave chemical/biological MEMS sensors (foundational technology licensed to BioScale, Inc.), development of vacuum packaging approaches for MEMS gyroscopes and accelerometers, and microfluidic systems for engineered tissue with integrated vasculature. While at Draper Laboratory, Dr. Cunningham attended courses at the MIT Sloan Business School, and audited courses in biology at MIT. In June 2000, Dr. Cunningham left Draper Laboratory to become the Founder and CTO of SRU Biosystems, a company established to commercialize Photonic Crystal (PC) biosensors, detection instruments, and assays for applications in drug discovery and diagnostics. Prof. Cunningham led teams (~30 people) that manufactured PC biosensor microplates, a family of detection instruments (desktop, laboratory bench, and highly automated systems for high throughput screening), and participated in all discussions with partner companies, investors, and large pharmaceutical customers. SRU Biosystems was renamed as XBody Biosciences in 2011 to reflect a new strategic focus on screening antibody and antibody fragment libraries as a service to pharmaceutical companies. XBody Biosciences was subsequently sold to Juno Therapeutics for \$46M. Dr. Cunningham joined the faculty of the ECE Department at Illinois in 2004 as an Associate Professor, where he established the Nanosensors Group at the Micro and Nanotechnology Laboratory (MNTL), representing the ECE Department's first faculty hire that spanned biosensing applications enabled by electrical engineering principles. At Illinois, Prof. Cunningham served as the Director of the NSF-funded Center for Innovative Instrumentation Technology (CiIT), the first Industry/University Cooperative Research Center at MNTL, and served among the initial faculty to join the newly-formed Bioengineering Department, where he was the founding Director of the Bioengineering Graduate Program. Prof. Cunningham established the first M.Eng. professional master's program in Bioengineering (and only the second M.Eng. program within the College) with strong participation from the UIUC Business School with a specialization in Bioinstrumentation. Prof. Cunningham was appointed as Interim Director of the MNTL in 2013, as was selected as Director of MNTL in 2014 after an international search. He was named as a Donald Biggar Willett Professor in Engineering in 2015, and as the Intel Alumni Endowed Chair in 2020.



Prof. Cunningham has authored or co-authored >193 peer-reviewed journal papers, >90 issued US patents, >154 conference talks, and has delivered >173 invited lectures (including several keynote and plenary lectures). He is a Fellow of IEEE, AAAS, NAI, OSA, RSC, and AIMBE. His work has been recognized through the IEEE Sensors Council Technical Achievement Award (2010) the Engineering in Medicine and Biology Society (EMBS) Technical Achievement Award (2014), and the IEEE Sensors Council Distinguished Lectureship (2013), and the IEEE Photonics Society Distinguished Lectureship (2018-2019). His research interests include biophotonics, bionanophotonics, micro/nanofabrication processes & materials, BioMEMS, lab-on-a-chip, microfluidics, biosensing, and applications in drug discovery, health diagnostics, mobile point-of-use detection systems, life science research, environmental monitoring, animal health, and food safety. Prof. Cunningham's key technical contributions and achievements stem from his invention and application of nanostructured photonic surfaces that efficiently couple electromagnetic energy into biological analytes, enabling high signal-to-noise sensing of materials that include small molecules, nucleic acids, proteins, virus particles, cells, and tissues. He has made key foundational contributions to the application of mobile devices (such as smartphones) to point-of-use detection systems that provide equivalent capabilities to laboratory-based instruments.

In addition to leading his own research group, Prof. Cunningham serves as the Director of the Center for Genomic Diagnostics at the Carl Woese Institute for Genomic Biology (IGB) and the Grainger College of Engineering, where he leads a team of ~10 faculty with expertise that spans bioinformatics, cancer biology, biochemistry, and engineering for the development of "liquid biopsy" approaches to disease diagnostics and health/wellness monitoring in collaboration with clinicians at Mayo Clinic, Stanford, and Huntsman Cancer Institute. Prof. Cunningham is leading the Center for Pathogen Diagnostics in collaboration with faculty at Zhejiang University. Prof. Cunningham co-leads one of the two programs at the Illinois Cancer Center on the Theme of Cancer Measurement Technology and Data Science.

Education:

Ph.D. Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, 1990
M.S. Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, 1987
B.S. Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, 1986

Expertise and Current Interests:

Nanoscale electromagnetics, electromagnetic metamaterials, nanostructure fabrication, biosensors, bionanotechnology, nanomedicine, nanomaterials, applications of nanotechnology in medical, biological, and environmental problems, biosensing applications in disease diagnostics and life science research, optical devices & components using nanostructured surfaces, point-of-use detection instrumentation, smart distributed systems for health care delivery, liquid biopsy.

Employment:

2004–Present
University of Illinois at Urbana-Champaign,
Department of Electrical and Computer Engineering
Department of Bioengineering
Associate Professor (2004-2010),
Professor (2010-2015),
Donald Biggar Willett Professor in Engineering, (2015-2020)
Intel Alumni Endowed Chair, (2020-)

2015-2020
University of Illinois Micro and Nanotechnology Laboratory
Director

2013-2014
University of Illinois Micro and Nanotechnology Laboratory
Interim Director

2009-2015

NSF Center for Innovative Instrumentation Technology (CiiT)

Director and PI

2010-2013

Bioengineering Graduate Program at the University of Illinois

Director

2000–2011

SRU Biosystems, Inc., Woburn, MA

Founder, Director, Chief Technical Officer

Company renamed X-Body Biosciences in 2011 and sold to Juno Therapeutics in 2015.

2000-2004

Tufts University School of Medicine, Department of Medicine, Boston, MA

Visiting Assistant Professor

2000-2004

University of Illinois at Urbana-Champaign, Department of Electrical and Computer Engineering

Adjunct Professor

1995-2000

Charles Stark Draper Laboratory, Cambridge, MA

Principal Member of Technical Staff

Group Leader for MEMS Sensors

Co-founding Associate Director of CIMIT (Center for Integration of Medicine and Innovative Technology)

Technical Director for Bioengineering Programs

1991-1995

Raytheon Company Research Division, Lexington, MA

Senior Project Scientist

1990-1991

Sandia National Laboratory, Albuquerque, NM

Postdoctoral Scientist

1987-1990

University of Illinois at Urbana-Champaign, Department of Electrical and Computer Engineering

Research Assistant for Prof. Gregory E. Stillman

Honors:

1986, Bronze Tablet (Highest Honors), University of Illinois at Urbana-Champaign

1987-1990, Army Research Fellowship

1987, Semiconductor Research Corporation Fellowship Award

1996, Draper Laboratory Engineering Lead Project: "MEMS Chemical Analysis Array"

2006, Draper Laboratory Best Patent Award, "Flexural Plate Wave Sensor and Array"

2007, 3M Nontenured Faculty Grant

2007, Senior Member of IEEE

2008, Xerox Award for Faculty Research

2005, 2007, 2008, 2010, 2011, 2012, 2013, 2015, 2018, 2020, 2021, 2022, 2023 Incomplete list of faculty rated "excellent" by students

2008, Grainger Program Award for Emerging Technologies

2009, Association for Laboratory Automation, Innovation Award for Top 10 Papers

2010, Medical Scholars Program Outstanding Advisor Award

2010, IEEE Sensors Council Technical Achievement Award

2012, IEEE Fellow
 2012, AIMBE Fellow
 2013, IEEE Sensors Council Distinguished Lecturer
 2013, National Academy of Inventors
 2014, Fellow of the Optical Society of America
 2014, IEEE Engineering in Medicine and Biology Society (EMBS) Technical Achievement Award
 2015, Donald Biggar Willett Professor of Engineering, University of Illinois at Urbana-Champaign
 2016, AAAS Fellow
 2018, Associate, Center for Advanced Studies
 2018, IEEE Photonics Society Distinguished Lecturer
 2018, Andrew Yang Research Award: Living Tissue Biosensors
 2020, Royal Society of Chemistry Fellow
 2020, George Anner Award for Excellence in Undergraduate Teaching
 2021, Everitt Award for Teaching Excellence (Grainger College of Engineering)
 2023, Michael S. Feld Biophotonics Award (Optica)
 2023, SPIE Senior Member
 2024, Grainger College of Engineering Award for Excellence in Graduate Advising

Selected Other Activities:

- IEEE Sensors Council, Secretary/Treasurer, 2008
- IEEE Sensors Council, VP Finance, 2009-2011
- Consultant, Rapid Diagnostek, 2011
- Consultant, Baxter, Inc., 2013
- Chair, Instrument and System Development Study Section, NIH, 2012-2014
- Founder, Exalt Diagnostics, 2012-2015
- External reviewer, Wayne State University, Microfabrication Facility, 2015
- External reviewer, Brigham Young University, Department of Electrical Engineering, 2016
- Chair, NIH Pediatric Sensor Development Special Emphasis Panel, 2015
- Chair, NIH K99 Review Panel, 2016
- UIUC Senate, 2005-2007, 2008-2009, 2015-2017
- College of Engineering Finance Task Force, 2017
- College of Engineering Growth Task Force, 2016
- Vice Chancellor's Ad-Hoc Committee for Optimizing Corporate Relations, 2017
- Theme Leader, Center for Genomic Diagnostics, Carle Woese Institute for Genomic Biology at the University of Illinois at Urbana-Champaign, 2017 - present
- Program Leader, Cancer Measurement Technology and Data Science, University of Illinois Cancer Center, 2018 – present
- Consultant, Reliant Immune Diagnostics, 2018 - 2020
- Co-Director, Center for Pathogen Diagnostics, 2020 – present
- Health Care Engineering System Center, Steering Committee, 2018 – present
- Chair, NIH/NIGMS New Investigator MIRA Panel, 2021, 2022
- Steering Committee: Personalized Nutrition Initiative, 2021 - present

Partial list of responsibilities and activities as Interim Director and Director of MNTL at UIUC (2013-2020) (<https://mntl.illinois.edu>)

Reporting to the Dean of the College of Engineering, I was responsible for managing a staff of 16 and overseeing all aspects of building operations, space, and research. The building is a 160,000 square foot facility with 60,000 square feet of occupiable space, an 8,000 square foot clean room, with a full suite of micro and nanofabrication equipment, device characterization, metrology, and a 3,000 square foot BioNanotechnology Laboratory. The building has 28 full-time resident faculty and ~40 affiliate faculty from departments across the University. The total resident count of the building is ~300, including faculty, staff, and students. Building operating expenses are ~\$3M/year, and research expenditures are ~\$12M/year. In addition to managing the facility and space, my responsibilities and contributions include:

- In 2014-2017, proposed and oversaw a \$4M expansion of the cleanroom facility to incorporate an undergraduate teaching laboratory for microelectronics fabrication (ECE444)
- Implementation of a \$4M project to increase efficiency of energy usage and conservation of other resources (power, DI water, city water, liquid nitrogen) with ~\$500K/year cost savings.
- In 2016, initiation of an Industry Affiliates Program to enable external companies to fund small “seed” research projects with MNTL faculty.
- Installation of a \$2M compound semiconductor epitaxial growth system as a shared use facility
- Establishment of a “branding” campaign for MNTL to make its messaging and materials viewed by external people consistent with the research themes. Included a complete overhaul of the MNTL web site, establishment of a quarterly electronic newsletter, annual report, and Advancement campaign. Includes development of new museum-quality lobby displays to highlight MNTL accomplishments to building visitors (such as prospective students and parents), and MNTL’s first effort to develop a comprehensive contact list for its alumni.
- In 2015-2017, initiated a joint MNTL-IGB Research Theme: Center for Genomic Diagnostics
- In 2017, established an “MNTL faculty crowdfunding” program to enable multiple faculty to combine resources for shared-use equipment, with cost sharing from the College.
- In 2014-2017, with colleagues Prof. Klara Narstedt and Paul Braun, gained \$2M NSF funding for the Data Infrastructure Building Blocks (DIBB) and Timely and Trustworthy Curator and Coordinator Building Blocks (T2C2) programs to enable MNTL tools to interface with a data management and cloud storage system to curate data while enable sharing among collaborators.
- Established working groups and committees that involve MNTL faculty in key aspects of MNTL governance, where none had existed previously.
- In 2017, established bi-annual Stillman Lecture Series at MNTL.
- In 2016-2017, leading establishment of the Illinois-JITRI Institute (IJI) – a partnership with the Jiangsu Industrial Technology Research Institute (JITRI) in Nanjing, China to facility research and commercialization of technology in the areas of micro/nanotechnology, biomedicine, and environmental technology.
- Led efforts to recruit new and established faculty to MNTL, yielding 11 faculty members from ECE, BioE, and MatSE in five years.
- In 2019, led the effort to rename the MNTL building as the “Nick Holonyak, Jr. Micro and Nanotechnology Laboratory”, in honor of our most impactful faculty member and alumnus.
- In 2019, led efforts to earn a \$4M Investment for Growth grant award from the campus, for upgrades to the set of fabrication tools in the MNTL cleanroom.

Responsibilities and accomplishments as Director of the Bioengineering Graduate Program and Director of Graduate Programs in the Bioengineering Department, 2010-2013

In 2009-2010, the Bioengineering Department at the University of Illinois at Urbana-Champaign sought to establish the ability to grant Ph.D. degrees and to have its own graduate program. Prior to this time, bioengineering-related activities existed within departments. Working with BioE Head, Prof. Mike Insana, a cross-campus Bioengineering Graduate Program (BGP) was conceived that would enable graduate students with advisors who were either “core” BioE faculty (with their primary academic appointment within BioE) or “affiliate” BioE faculty (whose academic appointment was in some other department, such as ECE, ChemE, Chemistry, Neuroscience, MatSE, Molecular Biology...) to also earn a Ph.D. with a Bioengineering department identity. Activities and initiatives included:

- Drafting, discussing, and adopting operating bylaws for the Bioengineering Graduate Program
- Developing and delivering communications (via web site, presentations to departments, presentations to University leadership) on the structure, goals, and policies of the BGP.
- Developing methodology and policies for the BioE Ph.D. qualifying exam.
- Developed and led the instruction of BioE502 (Bioengineering Professionalism) to meet training requirements (such as research ethics, and treatment of human subjects) for students supported by NIH and NSF grants.
- Recruiting faculty to participate as BGP advisors, and evaluating faculty applicants
- Developing procedures for evaluating graduate applicants and running the graduate admissions process

- Developing and running graduate recruitment activities, such as “BioE@Illinois Day” to bring together faculty and students from across campus, plenary speakers, and guest speakers to communicate the excitement and uniqueness of Bioengineering at Illinois.
- Founding the first revenue-generating professional Masters of Engineering (M.Eng) degree in Bioinstrumentation, representing only the second M.Eng. program implemented on the Illinois campus (<http://bioemeng.illinois.edu>) . The BioE M.Eng. program was conceived with Industry input to help students prepare for careers outside academia, and thus incorporates co-curricular activities in public speaking, FDA approval, and team leadership. Instruction was co-developed with faculty from the College of Business to incorporate coursework in intellectual property, the innovation process, and product development. Led the development of four new courses, available only to M.Eng. students. Now in its third year of operation, the Bioengineering M.Eng. program has 25 students/year, with a goal to expand to 40 students/year steady-state, and now includes an online option. Responsible for web site conception/execution, marketing, instructor recruiting, and financial model.

Publications:

Google Scholar: h-index=75, 19,979 citations

1. "Fault Characterization and Delay Fault Testing of GaAs Logic Circuits," B.T. Cunningham, P. Bannerjee, and W.K. Fuchs, Proceedings of the 1987 International Conference on Fault Tolerant Computing.
2. "Carbon Diffusion in undoped, n-type, and p-type GaAs," B.T. Cunningham, L.J. Guido, J.E. Baker, J.S. Major, Jr., N. Holonyak, Jr., and G.E. Stillman, Appl. Phys. Lett. Vol. 55, 687-689, 1989.
3. "Heavy Carbon Doping of MOCVD-grown GaAs using Carbon Tetrachloride," B.T. Cunningham, M.A. Haase, M.J. McCollum and G.E. Stillman, Appl. Phys. Lett. Vol. 54, 1905-1907, 1989.
4. "Layer Intermixing and Related Long-Term Instability in Heavily Carbon-Doped AlGaAs/GaAs Superlattices," I. Szafranek, M. Szafranek, J.S. Major, Jr., B.T. Cunningham, L.J. Guido, N. Holonyak, Jr., and G.E. Stillman, J. Electron Mater., Vol. 20, 409-418, 1990.
5. "Instability of Partially Disordered Carbon-Doped AlGaAs/GaAs Superlattices," I. Szafranek, J.S. Major, Jr., B.T. Cunningham, L.J. Guido, N. Holonyak, Jr., and G.E. Stillman, Appl. Phys. Lett. Vol. 27, 2910-2912, 1990.
6. "Layer Intermixing in Heavily Carbon-Doped AlGaAs/GaAs Superlattices," I. Szafranek, M. Szafranek, B.T. Cunningham, L.J. Guido, N. Holonyak, Jr., and G.E. Stillman, J. Appl. Physics, Vol. 68, 5615-5620, 1990.
7. "High Precision Temperature and Energy Dependent Refractive Index of GaAs Determined from Excitation of Optical Waveguide Eigenmodes," S.R. Kisting, P.W. Bohn, E. Andideh, I. Adesida, B.T. Cunningham, and G.E. Stillman, Appl. Phys. Lett. Vol. 57, 1328-1330, 1990.
8. "Column III-Column V Sublattice Interaction via Zn- and Si- Impurity-Induced Layer-Disordering of ^{13}C in Modulation Doped $\text{Al}_x\text{Ga}_{1-x}\text{As}$ Quantum Well Heterostructures," L.J. Guido, J.S. Major, Jr., J.E. Baker, N. Holonyak, Jr., B.T. Cunningham, and G.E. Stillman, Appl. Phys. Lett. Vol. 56, 572-574, 1990.
9. " CCl_4 Doped AlGaAs Grown by MOCVD," B.T. Cunningham, J.E. Baker, and G.E. Stillman, Appl. Phys. Lett. Vol. 56, 836-838, 1990.
10. " CCl_4 Doped $\text{Al}_x\text{Ga}_{1-x}\text{As}$ Grown by MOCVD," B.T. Cunningham, J.E. Baker, and G.E. Stillman, J. Electron. Mater. Vol. 19, 331-335, 1990.
11. "Carbon Doped Base GaAs/AlGaAs Heterojunction Bipolar Transistor grown by MOCVD using Carbon Tetrachloride as the Dopant Source," B.T. Cunningham, G.S. Jackson, and G.E. Stillman, Appl. Phys. Lett. Vol. 56, 361-363, 1990.
12. "Absence of ^{13}C Incorporation in $^{13}\text{CCl}_4$ Doped InP grown by MOCVD," B.T. Cunningham, J.E. Baker, S.A. Stockman, and G.E. Stillman, Appl. Phys. Lett. Vol. 56, 1760-1762, 1990.
13. "Effect of reduced temperature on the ft of AlGaAs/GaAs heterojunction bipolar transistors," J. Laskar, A.W. Hanson, B.T. Cunningham, J. Kolodzey, G.E. Stillman, and S.J. Prasas, IEEE Electron Device Letters, Vol 12, No. 6, p. 329-331, 1991.
14. "Modeling of Flexural Plate Wave Devices," M.W. Weinberg, B.T. Cunningham, and C. Clapp, JMEMS, Vol. 9, No. 3, p. 370-379, 2000.
15. "Al-Ga Interdiffusion in Heavily Carbon-Doped AlGaAs Quantum Well Heterostructures," L.J. Guido, B.T. Cunningham, D.W. Nam, K.C. Hsieh, W.E. Plano, J.S. Major, Jr., E.J. Vesely, A.R. Sugg, N. Holonyak, Jr., and G.E. Stillman, J. Appl. Phys. Vol. 67, 2179-2182, 1990.

16. "Bake stability of long-wavelength infrared HgCdTe photodiodes," A. Mestechkin, D.L. Lee, B.T. Cunningham, and B.D. MacLeod, *Journal of Electronic Materials*, Vol. 24, No. 9, p. 1183-1187, 1995.
17. "Silicon Micromachining to Tissue Engineer Branched Vascular Channels for Liver Fabrication," S. Kaihara, J. Borenstein, R. Koka, S. Lalan, M. Ravens, H. Pien, B.T. Cunningham, and J. Vacanti, *Tissue Engineering*, Vol. 6, No. 2, p. 105-117, 2000.
18. "Design, Fabrication and Vapor Characterization of a Microfabricated Flexural Plate Resonance Sensor and Application to Integrated Sensor Arrays," B.T. Cunningham, M. Weinberg, J. Pepper, C. Clapp, R. Bousquet, B. Hugh, R. Kant, C. Daly, E. Hauser, *Sensors and Actuators B*, Vol. 73, p. 112-123, 2001.
19. "Colorimetric Resonant Reflection as a Direct Biochemical Assay Technique," B.T. Cunningham, P. Li, B. Lin, and J. Pepper, *Sensors and Actuators B*, Vol. 81, p. 316-328, 2002.
20. "A Label-Free High Throughput Optical Technique for Detecting Small Molecule Interactions," B. Lin, J. Pepper, P. Li, H. Pien, and B.T. Cunningham, *Biosensors and Bioelectronics*, Vol. 17, No. 9, p. 827-834, 2002.
21. "A Plastic Colorimetric Resonant Optical Biosensor for Multiparallel Detection of Label-Free Biochemical Interactions," B.T. Cunningham, B. Lin, J. Qiu, P. Li, J. Pepper, and B. Hugh, *Sensors and Actuators B*, Vol. 85, No. 3, p. 219-226, 2002.
22. "Detection of proteins and intact microorganisms using microfabricated flexural plate wave resonator arrays," J. Pepper, R. Noring, M. Klempner, B.T. Cunningham, A. Petrovich, R. Bousquet, C. Clapp, J. Brady, and B. Hugh, *Sensors and Actuators B*, Vol. 96, No. 3, p. 565-575, 2003.
23. "Compact label-free biosensor using VCSEL-based measurement system," C.F.R. Mateus, M.C.Y. Huang, J.E. Foley, P.R. Beatty, P. Li, B.T. Cunningham, and C.J. Chang-Hasnain, *IEEE Photonics Technology Letters*, Vol. 16, No. 7, p. 1712-1714, 2004.
24. "Enhancing the Surface Sensitivity of Colorimetric Resonant Optical Biosensors," B.T. Cunningham, J. Qiu, P. Li, and C. Baird, *Sensors and Actuators B*, Vol. 87, No. 2, p. 365-370, 2002.
25. "A New Method for Label-Free Imaging of Biomolecular Interactions," P. Li, B. Lin, J. Gerstenmaier, and B.T. Cunningham, *Sensors and Actuators B*, Vol. 99, p. 6-13, 2004.
26. "Ultra Sensitive Immunoassay Using VCSEL Detection System," C.F.R. Mateus, M.C.Y. Huang, J.E. Foley, P.R. Beatty, P. Li, B.T. Cunningham, and C.J. Chang-Hasnain, *Electronic Letters*, Vol. 40, No. 11, 2004.
27. "Label-Free Assays on the BIND System," B.T. Cunningham, P. Li, S. Schulz, B. Lin, C. Baird, J. Gerstenmaier, C. Genick, F. Wang, E. Fine, and L. Laing, *Journal of Biomolecular Screening*, Vol. 9, p. 481-490, 2004.
28. "A Label-Free Biosensor-Based Cell Attachment Assay for Characterization of Cell Surface Molecules," B. Lin, P. Li, and B.T. Cunningham, *Sensors and Actuators B*, Vol. 114, No. 2, p. 559-564, 2006.
29. "Label-free Detection of Biomolecular Interactions: Applications in Proteomics and Drug Discovery," B.T. Cunningham and L.L. Laing, *Expert Reviews in Proteomics*, Vol. 3, No. 3, p. 271-281, 2006.
30. "Photonic Crystal Near UV Reflectance Filters Fabricated by Nano Replica Molding," N. Ganesh and B.T. Cunningham, *Applied Physics Letters*, Vol. 88, No. 7, p. 071110-071113, 2006.
31. "Photonic Crystal Optical Biosensor Incorporating Structured Low-Index Porous Dielectric," I.D. Block, L.L. Chan, and B.T. Cunningham, *Sensors and Actuators, B: Chemical*, Vol. 120, No. 1, p. 187-193, 2006.
32. "A Self-Referencing Method for Microplate Label-Free Photonic Crystal Biosensors," L.L. Chan, P.Y. Li, D. Puff, and B.T. Cunningham, *IEEE Sensors Journal*, Vol. 6, No. 6, p. 1551-1556, 2006.
33. "Self-Referenced Assay Method for Photonic Crystal Biosensors: Application to Small Molecule Analytes," L.L. Chan, P.Y. Li, D. Puff, and B.T. Cunningham, *Sensors and Actuators B*, Vol. 120, No. 2, p. 392-398, 2007.
34. "Near ultraviolet-wavelength photonic-crystal biosensor with enhanced surface-to-bulk sensitivity ratio," N. Ganesh, I.D. Block, and B.T. Cunningham, *Applied Physics Letters*, Vol. 89, No. 2, p. 023901-023904, 2006.
35. "Optically Tunable Photonic Crystal Reflectance Filter," D. Dobbs and B.T. Cunningham, *Applied Optics*, Vol. 45, No. 28, p. 7286-7293, 2006.
36. "Single-step fabrication of photonic crystal biosensors with polymer microfluidic channels by a replica molding process," C.J. Choi and B.T. Cunningham, *Lab-On-A-Chip*, Vol. 6, p. 1373-1380, 2006.
37. "Large-Area Submicron Replica Molding of Porous Low-k Dielectric Films and Application to Photonic Crystal Biosensor Fabrication," I.D. Block, L.L. Chan, and B.T. Cunningham, *Microelectronic Engineering*, Vol. 84, No. 4, p. 603-608, 2007.

38. "Fabrication of a graded wavelength guided mode resonant filter photonic crystal," D. Dobbs, I. Gershkovich, and B.T. Cunningham, *Applied Physics Letters*, Vol. 89, No.12, p.123113-123116, 2006.
39. "Microplasma devices and arrays fabricated by plastic-based replica molding," M. Lu, S.-J. Park, J.G. Eden, and B.T. Cunningham, *JMEMS*, Vol. 16, No. 6, p. 1397-1402, 2007.
40. "A label-free photonic crystal biosensor imaging method for detection of cancer cell cytotoxicity and proliferation," L. Chan, S. Gosangari, K. Watkin, and B.T. Cunningham, *Apoptosis*, Vol. 12, No, 6, p. 1061-1068, 2007.
41. "Combined Enhanced Fluorescence and Label-Free Biomolecular Detection with a Photonic Crystal Surface," P.C. Mathias, N. Ganesh, L.L. Chan, and B.T. Cunningham, *Applied Optics*, Vol. 46, No. 12, p. 2351-2360, 2007.
42. "Compact Wavelength Detection System Incorporating a Guided-Mode Resonance Filter," N.Ganesh, A. Xiang, N.B. Beltran, D.W. Dobbs, and B.T. Cunningham, *Applied Physics Letters*, Vol. 90, p. 081103-081106, 2007.
43. "A 96-well microplate incorporating a replica molded microfluidic network integrated with photonic crystal biosensors for high throughput kinetic biomolecular interaction analysis," C. J. Choi and B.T. Cunningham, *Lab On A Chip*, Vol. 7, p. 550-556, 2007.
44. "Enhanced fluorescence emission from quantum dots on a photonic crystal surface," N. Ganesh, W. Zhang, P.C. Mathias and B.T. Cunningham, *Nature Nanotechnology*, Vol. 2, No. 8, p. 515-520, 2007.
45. "A voltage-tuned resonant reflectance optical filter for visible wavelengths fabricated by nanoreplica molding," F. Yang, G. Yen, and B.T. Cunningham, *Applied Physics Letters*, Vol. 90, p. 261109-261111, 2007.
46. "A Replica Molding Technique for Producing Fibrous Chitosan Scaffolds for Cartilage Engineering," G.J. Slavik, G. Ragety, N. Ganesh, a D.J. Griffon, and B.T. Cunningham, *Journal of Materials Chemistry*, Vol. 17, p. 4095 - 4101, 2007.
47. "Label-free imaging of cancer cells using photonic crystal biosensors and application to cytotoxicity screening of a natural compound library," L.L. Chan, S. Gosangari, K.L. Watkin, and B.T. Cunningham, *Sensors and Actuators B*, Vol. 132, p. 418-425, 2008.
48. "A sensitivity model for predicting photonic crystal biosensor performance," I.D. Block, N. Ganesh, M. Lu, and B.T. Cunningham, *IEEE Sensors*, Vol. 8, No. 3, p. 274-280, 2008.
49. "High sensitivity photonic crystal biosensor incorporating nanorod structures for enhanced surface area," W. Zhang, N. Ganesh, I.D. Block and B.T. Cunningham, *Sensors and Actuators B*, Vol. 131, p. 279-284, 2008.
50. "Vertically emitting, dye-doped polymer laser in the green ($\lambda = 536$ nm) with a second order distributed feedback grating fabricated by replica molding," M. Lu, J.G. Eden, and B.T. Cunningham, *Optics Communications*, Vol. 281, p. 3159-3162, 2008.
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56. "A Combined Enhanced-Fluorescence and Label-Free Imaging Instrument," I.D. Block, P.C. Mathias, N. Ganesh, and B.T. Cunningham, IEEE Transducers 2009, Denver, CO, June 2009.
57. "Enhancing DNA Microarray Detection Limits Using Optical Resonances from Photonic Crystal Surfaces," P.C. Mathias, S.I. Jones, D.O. Gonzalez, L.O. Vodkin, and B.T. Cunningham, IEEE Transducers 2009, Denver, CO, June 2009.
58. "Effect of structural parameters of photonic crystal surface enhanced Raman spectroscopy substrate on the enhancement factor," S.-M. Kim, W. Zhang, and B.T. Cunningham, 15th Microoptics Conference, Tokyo, Japan, October 2009.
59. "A Method for Identifying Small Molecule Aggregators Using Photonic Crystal Biosensor Microplates," L.L. Chan, E.A. Lidstone, K.E. Finch, J.T. Heeres, P.J. Hergenrother, and B.T. Cunningham, EMBC 2009 Conference, Minneapolis, MN, September 2009.
60. "Microfluidic Chip for Combinatorial Mixing and Screening of Assays," B.R. Schudel, C.J. Choi, B.T. Cunningham and P. J. A. Kenis, AIChE 2009 Annual Meeting, Nashville, TN, November 2009.
61. "Stacked 2D photonic crystal reflectance filters fabricated by nanoreplica molding for improving optical density and angular tolerance," F. Yang, and B.T. Cunningham, Conference on Lasers and Electro-Optics (CLEO), San Jose, CA, May 2010.
62. "Magnification of photonic crystal fluorescence enhancement via TM resonance excitation and TE resonance extraction on a dielectric nanorod surface," H.-Y. Wu, W. Zhang, P.C. Mathias, and B.T. Cunningham, Conference on Lasers and Electro-Optics (CLEO), San Jose, CA, May 2010.
63. "Distributed feedback laser biosensor incorporating a titanium dioxide nanorod surface," C. Ge, M. Lu, W. Zhang, and B.T. Cunningham, Conference on Lasers and Electro-Optics (CLEO), San Jose, CA, May 2010.
64. "Label-free optofluidic biosensing in microplate, microfluidic, and spot-based affinity capture assays," C.J. Choi, A.R. Belobraydich, L.L. Chan, P.C. Mathias, and B.T. Cunningham, Conference on Lasers and Electro-Optics (CLEO), San Jose, CA, May 2010.
65. "A general and label-free method for assessing cellular attachment using photonic crystal biosensors," E.A. Lidstone, V. Chaudhery, A. Kohl, L. Trump, L.B. Schook, and B.T. Cunningham, Biomedical Engineering Society 2010 Annual Meeting, Austin, TX, October 2010.
66. "Photonic crystal biosensor label-free imaging to screen natural products that are cytotoxic to pancreatic cancer cells," S. George, and B.T. Cunningham, Biomedical Engineering Society 2010 Annual Meeting, Austin, TX, October 2010.
67. "Label-free prehybridization imaging of printed DNA microarrays for spot quality analysis," S. George and B.T. Cunningham, Biomedical Engineering Society 2010 Annual Meeting, Austin, TX, October 2010.
68. "Surface-enhanced raman scattering nanodomes fabricated by nanoreplica molding," C.J. Choi, Z. Xu, H.-Y. Wu, G.L. Liu, and B.T. Cunningham, IEEE Sensors Conference, Waikoloa, Hawaii, November 2010.
69. "Multi-color fluorescence enhancement from a photonic crystal surface," A. Pokhriyal, M. Lu, C.S. Huang, S. Schulz, and B.T. Cunningham, IEEE Sensors Conference, Waikoloa, Hawaii, November 2010.

70. "Large-area organic distributed feedback laser fabricated by nanoreplica molding and horizontal dipping," C. Ge, M. Lu, X. Jian, Y. Tan, and B.T. Cunningham, MRS 2010 Fall Meeting, Boston, MA, December 2010.
71. "Photonic crystal enhanced microscopy," V. Chaudhery, E.A. Lidstone, S. George, C.S. Huang, A. Kohl, and B.T. Cunningham, OSA Optics in the Life Sciences Congress, Monterey, CA, April 2011.
72. "Photonic crystal enhanced fluorescence using a quartz substrate to reduce limits of detection," A. Pokhriyal, M. Lu, V. Chaudhery, C. Huang, S. Schulz, and B.T. Cunningham, MRS 2011 Spring Meeting, San Francisco, CA, April 2011.
73. "Plasmonic coupling of SiO₂-Ag "post-cap" nanostructures and silver film for surface-enhanced Raman scattering," H.-Y. Wu and B.T. Cunningham, Conference on Lasers and Electro Optics (CLEO), Baltimore, MD, May 2011.
74. "Application of Photonic Crystal Enhanced Fluorescence to Antibody Microarrays," C.-S. Huang, S. George, M. Lu, V. Chaudhery, R. Tan, R.C. Zangar, and B.T. Cunningham, Conference on Lasers and Electro Optics (CLEO), Baltimore, MD, May 2011.
75. "Photonic crystal enhanced fluorescence using a quartz substrate to reduce limits of detection," A. Pokhriyal, M. Lu, C.S. Huang, S. Schulz, and B.T. Cunningham, Conference on Lasers and Electro Optics (CLEO), Baltimore, MD, May 2011.
76. "Nanodome sensor tubing for monitoring of intravenous drug infusion and metabolites," C.J. Choi, H.-Y. Wu, J. Weyhenmeyer, S. George, and B.T. Cunningham, IEEE Nano 2011, Portland, OR, August 2011.
77. "Optimization of photonic crystal enhanced fluorescence by excitation laser angle scanning," V. Chaudhery, M. Lu, A. Pokhriyal, S.C. Schulz, and B.T. Cunningham, IEEE Nano 2011, Portland, OR, August 2011.
78. "Using photonic crystal enhanced fluorescence on quartz substrates to improve the sensitivity of DNA microarrays," S. George, A. Pokhriyal, S.I. Jones, M. Lu, L.O. Vodkin, and B.T. Cunningham, 33rd International Conference of the IEEE Engineering in Medicine and Biology Society, Boston, MA, August 2011.
79. "Plastic-Based Distributed Feedback Laser Biosensors in Microplate Format," Y. Tan and B.T. Cunningham, IEEE Photonics Society Conference, Arlington, VA, October 2011.
80. "Optically Tunable External Cavity Ring Laser," J. Zheng, C. Wagner, C. Ge, M. Lu, B.T. Cunningham, and J.G. Eden, IEEE Photonics Society Conference, Arlington, VA, October 2011.
81. "Biochemical Sensor Tubing for Point-of-Care Monitoring of Intravenous Drugs and Metabolites," C.J. Choi, H.-Y. Wu, S. George, J. Weyhenmeyer, and B.T. Cunningham, MicroTAS 2011, Seattle, WA, October 2011.
82. "Plasmonic Nanogap-enhanced Raman Scattering Using a Resonant Nanodome Array," H.Y. Wu, C.J. Choi and B.T. Cunningham, Conference on Lasers and Electro-Optics (CLEO), Baltimore, MD, May 2012.
83. "Dissecting tumor immunity and apoptotic tolerance via cell-cell interaction assays with photonic crystal biosensors," G. Pattabiraman, E. Lidstone, B.T. Cunningham, D. Ucker, Engineering in Medicine and Biology Conference, San Diego, CA, August, 2012.
84. "Quartz-based photonic crystal surfaces for multiplexed cancer biomarker detection," C.-S. Huang, V. Chaudhery, J. Polans, M. Lu, A. Pokhriyal, S. George, R.C. Zangar, and B.T. Cunningham, IEEE Sensors Conference, Taipei, Taiwan, October 2012.
85. "Distributed feedback laser biosensor noise reduction," Y. Tan, A. Cu, M. Lu, and B.T. Cunningham, 2012 IEEE Photonics Conference, Burlingame, CA, September 2012.
86. "External cavity laser biosensor," C. Ge, M. Lu, S. George, C. Wagner, J. Zheng, A. Pokhriyal, C. Siu, J.G. Eden, and B.T. Cunningham, IEEE Photonics Conference, Burlingame, CA, September 2012.
87. "External cavity laser biosensor," C. Ge, M. Lu, S. George, C. Wagner, J. Zheng, A. Pokhriyal, C. Siu, J.G. Eden, and B.T. Cunningham, MRS Fall Meeting, Boston, MA, November 2012.
88. "Photonic crystal arrays for soybean gene expression and protein analysis," S.I. Jones, S. George, Y. Tan, B.T. Cunningham, and L. Vodkin, Plant and Animal Genomics Conference, San Diego, CA, January 2013.
89. "Detecting protein and miRNA cancer biomarkers using silicon-based photonic crystals and a resonance coupling laser scanning instrument," S. George, V. Chaudhery, M. Takagi, N. Amro, Y. Tan, and B.T. Cunningham, ASME 2013 2nd Global Congress on Nanoengineering for Medicine and Biology, Boston, MA, February 2013.
90. "Coupled external cavity photonic crystal enhanced fluorescence," American Physical Society Meeting, Baltimore, MD, March 2013.

91. "Photonic crystal fluorescence enhancement of protein and miRNA biomarker microarrays," S. George, V. Chaudhery, M. Lu, Y. Tan, and B.T. Cunningham, Oak Ridge Conference, Baltimore, MD, April 2013.
92. "A self-referencing biosensor based upon a dual-mode external cavity laser," M. Zhang, C. Ge, M. Lu, Z. Zhang, and B.T. Cunningham, Conference on Lasers and Electro Optics (CLEO), San Jose, CA, June 2013.
93. "Enhanced fluorescence emission using a photonic crystal coupled to an optical cavity," A. Pokhriyal, M. Lu, V. Chaudhery, S. George, and B.T. Cunningham, Conference on Lasers and Electro Optics (CLEO), San Jose, CA, June 2013.
94. "Point-of-care Detection and Real-time Monitoring of Intravenously Delivered Drugs via Tubing with an Integrated SERS Sensor," H.-Y. Wu, D. Ortin, B.T. Cunningham, 2013 Frontiers in Optics/Laser Science, Orlando, FL, October 2013.
95. "Photonic crystal enhanced microscopy for imaging of live cell adhesion," W. Chen, M. Lu, K.D. Long, V. Chaudhery, H. Yu, J. Polans, J.S. Choi, B.A. Harley, and B.T. Cunningham, 2013 Frontiers in Optics/Laser Science, Orlando, FL, October 2013.
96. "External cavity laser biosensor," M. Zhang, C. Ge, M. Lu, C.J. Wagner, J. Zheng, A. Pokhriyal, J.G. Eden, B.T. Cunningham, Frontiers in Optics/Laser Science, Orlando, FL, October 2013.
97. "Point-of-care Detection and Real-time Monitoring of Intravenously Delivered Drugs via Tubing with an Integrated SERS Sensor," H.-Y. Wu, D. Ortin, B.T. Cunningham, Nano Today Conference, Biopolis, Singapore, December 2013.
98. "Detection of plant transcription factors using sensitive silicon photonic crystal protein arrays," S.I. Jones, Y. Tan., M. Shamimuzzaman, S. George, B.T. Cunningham, L.O. Vodkin, Plant and Animal Genome XXII, San Diego, CA, January 2014.
99. "Photonic crystal enhancement of a homogeneous fluorescent assay using submicron fluid channels fabricated by e-jet patterning," Y. Tan, E. Sutarso, A. Alleyne, and B.T. Cunningham, SPIE BIOS, San Francisco, CA, February, 2014.
100. "Discrete frequency infrared spectroscopic imaging with guided Fano resonators," J.-N. Liu, M.W. Schulmerich, R. Bhargava, and B.T. Cunningham, SPIE Sensing Technology & Applications Conference, Baltimore, MD, May 2014.
101. "Detection of single nano particles using photonic crystal enhanced microscopy," Y. Zhuo, H. Hu, W. Chen, L. Tian, H. Yu, K.D. Long, E. Chow, W.P. King, S. Singamaneni, and B.T. Cunningham, Conference on Lasers and Electro-Optics (CLEO), San Jose, CA, June 2014.
102. "Narrowband guided Fano resonators for mid-infrared spectroscopy and imaging," J.-N. Liu, M.V. Schulmerich, R. Bhargava, and B.T. Cunningham, Conference on Lasers and Electro-Optics (CLEO), San Jose, CA, June 2014.
103. "Liquid-tuned plasmonic external cavity laser," M. Zhang and B.T. Cunningham, Conference on Lasers and Electro-Optics (CLEO), San Jose, CA, June 2014.
104. "Single-Cell Approaches to Assess Hematopoietic Stem Cell Response to Matrix Cues ," J.S. Choi, Y. Ilin, Y. Zhuo, B.T. Cunningham, M. Kraft, and B.A.C. Harley, BMES 2014 Annual Meeting, San Antonio, TX, October 2014.
105. "Detection of protein-small molecule binding using a self-referencing external cavity laser biosensor," M. Zhang, J. Peh, P.J. Hergenrother, and B.T. Cunningham, Engineering in Medicine and Biology Conference, Chicago, IL, August 2014.
106. "Protein-protein binding detection with nano particle photonic crystal enhanced microscopy," Y. Zhuo, L. Tian, W. Chen, H. Yu, S. Singamaneni, and B.T. Cunningham, Engineering in Medicine and Biology Conference, Chicago, IL, August 2014.
107. "Smartphone fluorescence spectroscopy," H. Yu, Y. Tan., and B.T. Cunningham, Engineering in Medicine and Biology Conference, Chicago, IL, August 2014.
108. "Enhanced live cell imaging via photonic crystal enhanced fluorescence microscopy," W. Chen, K.D. Long, H. Yu, Y. Tan, J.S. Choi, and B.T. Cunningham, Engineering in Medicine and Biology Conference, Chicago, IL, August 2014.
109. "Smartphone fluorescence spectroscopy," H. Yu, Y. Tan, and B.T. Cunningham, SPIE Photonics West, San Francisco, CA, February 2015.
110. "Surface attachment profiling of stem cell differentiation using Photonic Crystal Enhanced Microscopy (PCEM)," Y. Zhuo, J.S. Choi, H. Yu, B.A. Harley, and B.T. Cunningham, ASME 2015 4th Global Congress on NanoEngineering for Medicine and Biology, Minneapolis, MN, April 2015.

111. "Dynamic label-free imaging of live-cell adhesion using photonic crystal enhanced microscopy (PCEM)," Y. Zhuo, J.S. Choi, H. Yu, B.A. Harley, and B.T. Cunningham, Conference on Lasers and Electro-Optics (CLEO), San Jose, CA, 2015.
112. "Region specific enhancement of quantum dot emission using interleaved two-dimensional photonic crystals," G.G. See, L. Xu, M.S. Naughton, T. Tang, Y. Bonita, J. Joo, P. Trefonas, K. Deshpande, P. J.A. Kenis, R.G. Nuzzo, and B.T. Cunningham, Conference on Lasers and Electro-Optics (CLEO), San Jose, CA, 2015.
113. "RT-LAMP On a Chip for Bloodborne Viral Load Diagnostics," G. Damhorst, C. Duarte, W. Chen, B.T. Cunningham, and R. Bashir, BMES Annual Meeting, Tampa, FL, October 2015.
114. "Polarization controlled output of electrohydrodynamic jet printed quantum dot embedded photonic crystals for display applications," G.G. See, L. Xu, E. Sutanto, A.G. Alleyne, R.G. Nuzzo, and B.T. Cunningham, IEEE Photonics Conference, Reston, VA, October 2015.
115. "Discrete-frequency infrared microspectroscopy using monolithically integrated photonic filters," J. Liu, R. Bhargava, and B.T. Cunningham, IEEE Photonics Conference, Reston, VA, October 2015.
116. "Smartphone-based absorption spectroscopy: Moving toward a truly handheld device," K.D. Long, H. Yu, H.M. Le, S. Lumetta, and B.T. Cunningham, BMES Annual Meeting, Tampa, FL, October 2015.
117. "Optical smartphone biosensing techniques," K.D. Long, H. Yu, B.T. Cunningham, Pittcon 2016, Atlanta, GA, March 2016.
118. "High performance plasmonic and photonic crystals for label-free and fluorescence-based biosensing," M.C. George, A. Farhang, B. Williamson, J.-N. Liu, M. Black, T. Wangensteen, M. Foreman, and B.T. Cunningham, Biosensors 2016, Gothenburg, Sweden, May 2016.
119. "Wafer-scale plasmonic and photonic crystal sensors for label-free and fluorescence-based detection," M.C. George, A. Farhang, J.-N. Liu, B. Williamson, M. Black, T. Wangensteen, and B.T. Cunningham, Biosensors 2016, Gothenburg, Sweden, May 2016.
120. "Characterization of liquid absorption and emission spectra using linear variable filters integrated with a CMOS camera," Y. Wan, J. Carlson, B. Kesler, W. Peng, P. Su, S. Al-Mulla, J.M. Dallesasse, and B.T. Cunningham, Conference on Lasers and ElectroOptics (CLEO), San Jose, CA, June 2016.
121. "Lasing emission from plasmonic nanodome arrays," H.-Y. Wu, L. Liu, M. Lu, and B.T. Cunningham, Conference on Lasers and ElectroOptics (CLEO), San Jose, CA, June 2016.
122. "Photonic crystal sensor incorporating structured low-index porous silicon dioxide," Y. Wan, N.A. Krueger, C. Ocier, P. Su, P.V. Brawn, and B.T. Cunningham, Conference on Lasers and ElectroOptics (CLEO), San Jose, CA, June 2016 (invited poster session on optical biosensors).
123. "Photonic crystal coupled plasmonic hybrid nanosensors," J.N. Liu, Q. Huang, and B.T. Cunningham, IEEE Photonics Conference, Waikoloa Village, HI, October 2016.
124. "Integration of linear variable filters on CMOS for compact emission and absorption sensing," J. Carlson, Y. Wan, B. Kelser, W. Peng, S. Al-Mullah, P. Su, J. Dallesasse, and B.T. Cunningham, IEEE Sensors Conference, Orlando, FL, November 2016.
125. "Porous photonic crystal external cavity laser biosensor for drug screening," Q. Huang, J. Peg, P.J. Hergenrother, and B.T. Cunningham, IEEE Sensors Conference, Orlando, FL, November 2016.
126. "Smartphone-based thin layer chromatography for the discrimination of falsified medicines," H. Yu, H. Le, E. Kaale, T. Layoff, and B.T. Cunningham, IEEE Sensors Conference, Orlando, FL, November 2016.
127. "An automated microfluidic assay for the detection of cancer biomarkers in serum using photonic crystal enhanced fluorescence," L. Kwon, C. Race, M. Foreman, and B.T. Cunningham, IEEE Sensors Conference, Orlando, FL, November 2016.
128. "Achieving uniformity and reproducibility for photonic crystal fluorescence enhanced disease diagnostic microarrays," C. Race, L. Kwon, and B.T. Cunningham, IEEE Sensors Conference, Orlando, FL, November 2016.
129. "Cell adhesion phenotype library with photonic crystal enhanced microscopy," Y. Zhuo, J.S. Choi, H. Yu, B.A. Harley, and B.T. Cunningham, OSA Biophotonics Congress, San Diego, CA, April 2017.
130. "An automated microfluidic assay and photonic crystal enhanced fluorescence platform for the detection of human papillomavirus-associated oropharyngeal cancer biomarkers in serum," L. Kwon, C. Race, M. Foreman, H. Inan, S. Kesiraji, R.C. Zangar, U. Demirci, K. Anderson, and B.T. Cunningham, American Physician Scientist Association Annual Conference, Chicago, IL, April 2017.

131. "Quantitative label-free imaging of live-cell adhesion using photonic crystal enhanced microscopy," Y. Zhuo¹, J.S. Choi, T. Marin, H. Yu, B.A. Harley, and B.T. Cunningham, Conference on Lasers and Electro Optics (CLEO), San Jose, CA, May 2017.
132. "PathTracker: Mobile Platform for Multiplexed Infectious Disease Detection and Epidemiology," W. Chen, H. You, F. Sun, A. Ornob, R. Brisbin, A. Ganguli, V. Vemuri, P. Strzebonski, G. Cui, K. Allen, S. Desai, W. Lin, D. Nash, D. Brooks, R. Bashir, and B.T. Cunningham, NSF Program Meeting: Partnerships for Innovation: Building Innovation Capacity, Atlanta, GA, June 2017.
133. "Imaging of Stem Cell Adhesion and Dynamic Tracking of Boundary Evolution Using Photonic Crystal Enhanced Microscopy (PCEM)," Y. Zhuo, J.S. Choi, T. Marin, H. You, B.A. Harley, and B.T. Cunningham, Microscopy and Microanalysis 2017, St. Louis, MO, August 2017.
134. "Nanoantenna-Microcavity Hybrid Resonators with Highly Cooperative Plasmonic-Photonic Coupling," J.-N. Liu, Q. Huang, K. Liu, S. Singamaneni, and B.T. Cunningham, IEEE Photonics Conference, Orlando, FL, October 2017.
135. "Design and demonstration of the Transmission, Reflection, and Intensity (TRI)-Analyzer instrument for portable spectroscopy," K.D. Long, E.V. Woodburn, and B.T. Cunningham, NIH-IEEE Point of Care Technologies Conference, Bethesda, MD, November, 2017. BEST STUDENT PRESENTATION.
136. "Multiplexed detection of infectious diseases with a smartphone," F. Sun, H. Yu, W. Chen, R. Brisbin, A. Ornob, A. Ganguli, D. Nash, D. Hirschberg, R. Bashir, and B.T. Cunningham, NIH-IEEE Point of Care Technologies Conference, Bethesda, MD, November, 2017. BEST STUDENT PRESENTATION FINALIST.
137. "Functional Photonic Crystals Fabricated by Helium Ion Lithography," H. Hu, Y. Zhuo, Y. Wang, M. Lu and B.T. Cunningham, IEEE NEMS, Singapore, April 2018.
138. "Photonic Resonator Outcoupler Microscopy (PROM) for quantitative monitoring of stem cell focal adhesion area," Y. Zhuo, J.S. Choi, T. Marin, H. Yu, B.A. Harley, and B.T. Cunningham, OSA Frontiers in Optics, Laser Science, Washington, DC, September 2018.
139. "Smartphone-based spectrometry: new portable system for food and pharmaceutical analysis," M.A. Aguirre, K.D. Long, A. Canals, and B.T. Cunningham, X Iberian Spectroscopy Conference, Lisboa, Portugal, July 2018.
140. "Microcavity-powered local field enhancement at plasmonic nano antennas," J.-N. Liu, Q. Huang, K.-K. Liu, S. Singamaneni, and B.T. Cunningham, Conference on Lasers and Electro-optics (CLEO), San Jose, CA, May 2019.
141. "Microcavity-mediated spectrally tunable absorption enhancement in plasmonic nanoantennas," Q. Huang and B.T. Cunningham, OSA Frontiers in Optics, Washington, DC, September 2019.
142. "Gene-edited live cell sensor for free calcium," Fu , D.H. Lee , T. Gaj , and B.T. Cunningham, IEEE Sensors Conference, Montreal, Canada, October 2019.
143. "Smartphone-based multiplex 30-minute nucleic acid test of live virus from nasal swab extract," F. Sun, A. Ganguli, J. Nguyen, R. Brisbin, K. Shanmugam, D.L. Hirschberg, M.B. Wheeler, R. Bashir, D.M. Nash and B.T. Cunningham, Biosensors for Pandemics, virtual conference, May 6, 2020.
144. "Toehold-mediated miRNA detection based on plasmonic-photonic hybrid microscopy," N. Li, T.D. Canady, Y. Lu, A.M. Smith, M. Kohli, B.T. Cunningham, OSA Optical Sensors Conference (virtual meeting), June 2020.
145. "Activate capture and digital counting (AC+DC) assay on a self-powered microfluidic cartridge for protein biomarker detection," C. Che, N. Li, K.D. Long, M.A. Aguirre, T.D. Canady, Q. Huang, U. Demirci, and B.T. Cunningham, OSA Optical Sensors Conference (virtual meeting), June 2020.
146. "Single-step, Digital Immunoassay for rapid analysis of serological COVID-19 antibody by photonic resonator absorption microscopy," B. Zhao, C. Che, W. Wang, N. Li, and B.T. Cunningham, COVID/SARS CoV2 Rapid Research Reports (virtual conference), August 2020.
147. "Smartphone-based multiplex 30-minute nucleic acid test of live virus from nasal swab extract," F. Sun, A. Ganguli, J. Nguyen, R. Brisbin, K. Shanmugam, D. Hirschberg, M. Wheeler, D. Nash, B.T. Cunningham, BMES Annual Meeting (virtual conference), October 2020.
148. "Smartphone-based hemocytometer and neural network for white blood cell count and differential," E.G. Onal, S. Zhang, T. Yathaputanan, R. Pu, F. Zheng, N. Sobh, and B.T. Cunningham, BMES Annual Meeting (virtual conference), October 2020.
149. "Photonic resonator interferometric scattering microscopy," N. Li, T.D. Canady, Q. Huang, X. Wang, and B.T. Cunningham, BMES Annual Meeting, Orlando, FL, October 2021.

150. "On chip detection of Zika virus in whole blood using RT-LAMP," A. Jankelow, H.-K. Lee, F. Sun, V. Kindratenko, K. Koprowski, E. Valera, B.T. Cunningham, and R. Bashir, BMES Annual Meeting, Orlando, FL, October 2021.
151. "Digital-resolution and highly sensitive detection of exosomal small RNA by DNA toehold probe-based photonic resonator absorption microscopy," B. Zhao, W. Wang, N. Li, T. Garcia-Lezana, X. Wang, C. Che, A. Villanueva, and B.T. Cunningham, BMES Annual Meeting, Orlando, FL, October 2021.
152. "Point-of-care detection of nucleic acid using a portable photonic resonator absorption microscope," S. Ghosh, N. Li, Y. Xiong, Y.-G. Ju, M.P. Rathslag, E.G. Onal, E. Falkiewicz, M. Kohli, and B.T. Cunningham, BMES Annual Meeting, Orlando, FL, October 2021.
153. "Photonic resonator-outcoupled magnetic-plasmonic nanoTags (PROMPT) for ultrafast and ultrasensitive detection of microRNA," C. Che, R. Due, N. Li, X. Wang, and B.T. Cunningham, BMES Annual Meeting, Orlando, FL, October 2021.
154. "Photonic crystal enhanced quantum dots for sensing cancer-associated miRNA biomarkers with digital-resolution and single-base selectivity," Y. Xiong, Q. Huang, T.D. Canady, P. Barya, O.H. Arogundade, C.M. Race, S. Liu, A.M. Smith, M. Kohli, and B.T. Cunningham, BMES Annual Meetings, Orlando, FL, October 2021.
155. "V-Pods: Rapid, sensitive detection of intact SARS-CoV-2 using DNA nets and a smartphone-linked fluorimeter," N. Chauhan, W. Wang, H.K. Lee, Y. Xiong, T. Zhang, N. Magazine, Lu Peng, L. Zhou, W. Huang, X. Wang, B.T. Cunningham, SPIE Defense+Commercial Sensing Conference, Orlando, FL, April 2022.
156. "Photonic crystal enhanced emission and blinking suppression for single quantum dot digital resolution biosensing of cancer-associated miRNA biomarkers," Y. Xiong, Q. Huang, T.D. Canady, P. Barya, S. Liu, O.H. Arogundade, C.M. Race, X. Wang, L. Zhou, X. Wang, M. Kohli, A.M. Smith, and B.T. Cunningham, Conference on Lasers and Electro-Optics (CLEO), San Jose, CA, May 2022.
157. "On chip point-of-care detection of Zika virus in whole blood using spatial RT-LAMP," A. Jankelow, H.K. Lee, W. Wang, T.-H. Hoang, F. Sun, V. Kindratenko, K. Koprowski, E. Valera, M. N. Do, B.T. Cunningham, R. Bashir, Biomedical Engineering Society 2022 Annual Meeting, San Antonio, TX, October 2022.
158. "Photonic crystal enhanced quantum dot biosensor for cancer-associated miRNA detection," Y. Xiong, Q. Huang, T.D. Canady, P. Barya, S. Liu, O.H. Arogundade, C.M. Race, C. Che, X. Wang, L. Zhou, A. Igarashi, X. Wang, M. Kohli, A.M. Smith, and B.T. Cunningham, IEEE Sensors Conference, Dallas, TX, November 2022.
159. "Smartphone clip-on instrument and microfluidic processor for rapid sample-to-answer detection of Zika virus in whole blood using spatial RT-LAMP," W. Wang, H. Lee, A.M. Jankelow, T.-H. Hoang, A. Bacon, F. Sun, S. Chae, V. Kindratenko, K. Koprowski, R.A. Stavins, D.D. Ceriani, Z.W. Engelder, W.P. King, M.N. Do, R. Bashir, E. Valera, and B.T. Cunningham, SPIE Photonics West, San Francisco, CA, January 2023.
160. "Rapid, sensitive detection of intact SARS-CoV-2 using DNA nets and a smartphone-linked fluorimeter," H. Lee, W. Wang, N. Chauhan, Y. Xiong, N. Magazine, O. Valdescruz, D.Y. Kim, T. Qiu, W. Huang, X. Wang, B.T. Cunningham, SPIE Photonics West, San Francisco, CA, January 2023.
161. "Ultrasensitive Detection of microRNA Using Photonic Resonator Absorption Microscopy," X. Wang, S. Shepherd, N. Li, C. Che, T. Song, Y. Xiong, I.R. Palm, B. Zhao, M. Kohli, U. Demirci, Y. Lu, B.T. Cunningham, Pittcon, Philadelphia, PA, March 2023.
162. "Scattering on a Metasurface: Single-Molecule Counting of Viruses and Exosomes with Photonic Resonator Interferometric Scattering Microscopy," J. Tibbs, N. Li, X. Wang, L. Liu, C. Che, A.S. Peinetti, B. Zhao, P. Barya, L. Cooper, L. Rong, X. Wang, Y. Lu, B.T. Cunningham, Pittcon, Philadelphia, PA, March 2023.
163. "Plasmonic-Photonic Hybrid System for Enhanced Fluorescent-based Digital Resolution Biosensing". Y. Xiong*, P. Barya*, S. Shepherd*, R. Gupta, L. D. Akin, J. Tibbs, H. K. Lee, S. Liu, S. Singamaneni, and B. T. Cunningham, International Conference on Surface Plasmon Photonics (SPP10), Houston, Texas, May 2023.
164. "Photonic Crystal Enhanced Fluorescence with DNA-based Nano-gripper for Ultrasensitive SARS-CoV-2 Biosensing," Y.. Xiong, L. Zhou, L. Cooper, S. Shepherd, T. Song, A. Dwivedy, L. Rong, T. Wang, X. Wang, B.T. Cunningham, IEEE Photonics Conference, Orlando, FL, November 2023.

165. "Automated Photonic Resonator Absorption Microscope for Point of Care Biomarker Detection," W. Liu, T. Ayupova, W. Wang, S. Shepherd, X. Wang, M. Kohli, U. Demirci, and B.T. Cunningham, IEEE Photonics Conference, Orlando, FL, November 2023.
166. "Label-free Imaging with Photonic Crystal Surface for Hematopoietic Stem Cell Differentiation," Y. Zhuo, J.S. Choi, T. Marin, H. Yu, B. Harley, B.T. Cunningham, Optical Biophotonics Congress, F. Lauderdale, FL, April 2024.
167. "Digital Immunoassay for Rapid Detection of SARS-CoV-2 Infection in a Broad Spectrum of Animals," S. Li, W. Wang, C. Chen, J.M. Reinhart, D. Diel, B.T. Cunningham, Y. Fang, American Society of Virology Annual Meeting, Columbus, OH, June, 2024.

Chapters in Books:

1. "Optical Biosensors," B T Cunningham, Encyclopedia of Sensors, American Scientific Publishers, 2005.
2. "High Resolution Label-Free Detection Applied to Microarray Research," L. Laing and B.T. Cunningham, Functional Protein Microarray in Drug Discovery, edited by P.F. Predki, CRC Press, p. 217-236, 2007.
3. "Label-Free Optical Biosensors: An Introduction," B.T. Cunningham, Label Free Biosensors: Techniques and Applications, edited by M. Cooper, Cambridge University Press, 2008.
4. "Photonic Crystals for Biosensing," B.T. Cunningham, I.D. Block, L. Chan, N. Ganesh, M. Lu, and P.C. Mathias, in Selected Topics in Metamaterials and Photonic Crystals, edited by Andrea Cusano, World Scientific, 2010.
5. "Design and implementation of vertically emitting distributed feedback lasers for biological sensing," M. Lu, S.S. Choi, C.J. Wagner, J.G. Eden, and B.T. Cunningham, in Label-Free Technologies for Drug Discovery, Edited by Matthew Cooper and Lorenz M. Mayr, published by Wiley, 2011.
6. "Label-Free Biosensor Imaging on Photonic Crystal Surfaces," Y. Zhuo and B.T. Cunningham, in Label-Free Sensing, Edited by S. Holler, MDPI, p. 32-57, 2016.
7. "Noninvasive optical imaging of stem cell differentiation in biomaterials using photonic crystal surfaces," J.S. Choi, Y. Zhuo, B.T. Cunningham, B.A.C. Harley, in Monitoring and Evaluation of Biomaterials and their Performance in Vivo, edited by Roger Narayan, p. 195-207, Science Direct, 2017. ISBN: 978-0-08-100603-0
8. "Nano-engineering at functional photonic crystal interfaces" in 'Nano-Engineering at Functional Interfaces for Multi-Disciplinary Applications: Electrochemistry, Photoplasmonics, Antimicrobials and Anticancer Applications'. Editors: Sai Sathish Ramamurthy, Seemesh Bhaskar and Narendra Reddy. Publication: Elsevier, 2024. ISBN: 0443216916, 9780443216916. Link for the book: https://books.google.com/books?id=h9UHEQAAQBAJ&newbks=1&newbks_redir=0&hl=en

Invited Lectures:

1. Implanted biosensors, *Center for Innovative Minimally Invasive Therapy/Society for Minimally Invasive Therapy (CIMIT/SMIT) Annual Meeting*, May, 1999, Boston, MA.
2. MEMS and biology," *University of Illinois Electrical and Computer Engineering Department Seminar*, April, 2000, Champaign, IL
3. The marriage of combinatorial peptide libraries and a label free biosensor for detection of microorganisms, *Boston University Bioinformatics Technology Seminar*, July, 2001, Boston, MA.
4. Transitioning from government laboratory to marketplace, *ASME Lab-on-a-Chip Workshop*, Washington, DC, September, 2001.
5. Microreplicated plastic label-free biosensor arrays for high throughput genomics, proteomics, and diagnostics applications, *BioMEMS 2002*, April, 2002, Cambridge, MA.
6. SRU biosystems: formation of a BioMEMS startup company, *BioMEMS 2002 Workshop*, April, 2002, Cambridge, MA.
7. Integration of plastic biosensors into disposable liquid handling labware, *Microfluidics 2002*, September, 2002, San Francisco, CA.
8. Nanostructured optical biosensors and applications in pharmaceutical discovery, *University of Illinois ECE Department Seminar*, October, 2002, Champaign, IL.
9. High throughput label-free assays using plastic biosensor sheets embedded in microtiter plates and microarray slides, *Screentech 2003*, March, 2003.
10. A novel direct binding screening system, *Society of Biomolecular Screening 2003 Annual Meeting*, September, 2003, Portland, OR.

11. Nanostructured label-free biosensor arrays for biomolecular and cellular assays, *Northwestern University Physics Department Seminar*, October, 2003.
12. A label-free direct binding assay system for high throughput screening, *American Association of Pharmaceutical Scientists 2003 Annual Meeting*, October, 2003, Salt Lake City, UT.
13. Label-free assays on the BIND system, *Lab Automation 2004 Section on Emerging Technologies*, February, 2004, San Jose, CA.
14. Nanostructured biosensors manufactured by the square yard and applications in pharmaceutical discovery, *Nanobiotechnology Conference*, April, 2004, San Francisco, CA.
15. Photonic crystal biosensors for direct pathogen detection and rapid diagnostics testing, *Army Research Office Workshop for On-Chip Detection and Identification of Biological and Chemical Molecules*, April 29, 2004, Raleigh, NC.
16. Label-independent detection using photonic crystal biosensors and applications in homeland security, *CNST Nanotechnology Homeland Security Workshop*, May 7, 2004, Champaign, IL.
17. Label-independent detection using photonic crystal biosensors and applications in homeland security, *US Army Natick Soldier Center Seminar*, June 9, 2004.
18. Biosensor multiwell microplate with self-reference capability, *IEEE Sensors 2004*, October 15, 2004, Vienna, Austria.
19. Biosensor applications in neuroscience research and drug discovery, *Dartmouth Conference on Translational Research in the Neurosciences*, October, 2005, Cambridge, MA.
20. Photonic crystal biosensors, *OSA Information Photonics*, June, 2005, Charlotte, NC.
21. Replica molding methods and applications in sensors, transducers, microplasma discharges, and tissue engineering, *Charles Stark Draper Laboratory MEMS Seminar*, March, 2006, Cambridge, MA.
22. Photonic crystal biosensors and applications in drug discovery, *American Society of Agricultural and Biological Engineers Annual International Meeting*, July, 2006, Portland, OR.
23. Photonic Crystal Biosensors, University of Illinois ECE Department Graduate Seminar, February 2007.
24. Photonic Crystal Biosensors, OSA Workshop on Nanophotonics, Champaign, IL, April 2007.
25. "Photonic crystal biosensor microplates with integrated fluid networks for high throughput applications in drug discovery," SPIE Conference on Optics and Photonics, San Diego, CA, August 2007.
26. "Photonic Crystal Biosensors," SPIE Defense and Security Symposium, Orlando, FL, March 2008.
27. "Optical Resonators for Label-Free Detection: Photonic Crystals, Microrings, and Lasers," SBS Symposium on Label-Free Technologies in Drug Discovery, June 2008, Dresden, Germany.
28. "Photonic crystal optofluidics for high throughput biosensing," C.J. Choi, and B.T. Cunningham, Conference on Lasers and Electro Optics, May 2008, San Jose, CA.
29. "Tunable photonic crystal reflection filters on flexible plastic substrates," Tri-Service Information Exchange on Agile Laser Protection, Hilton Head, SC, April 2008.
30. "Photonic crystal biosensors for label-free detection and fluorescence enhancement," Gordon Research Conference in Bioanalytical Sensors, Providence, RI, June, 2008.
31. "Preliminary studies on biologically active proteins/peptides from medicinal plants," ASABE Conference, Providence, RI, June, 2008.
32. "Sensors for Embedded Intelligence," Baxter Corporation Biannual Conference on Global R&D, Vienna, Austria, July, 2008.
33. "Photonic Crystal Biosensors and Tunable Resonant Optical Devices," IEEE LEOS Conference on Optical MEMS and Nanophotonics, Freiburg, Germany, August, 2008.
34. "Optical Resonators for Label Free Detection: Photonic Crystals and Lasers," University of Illinois Electromagnetics Symposium, Urbana, IL, September, 2008.
35. "Photonic crystals: A platform for label-free and enhanced fluorescence biomolecular and cellular assays," 2008 MRS Fall Meeting, Boston, MA, December 2008.
36. "Photonic crystal biosensors for high throughput drug discovery, environmental monitoring, and biomarker detection," Pittcon 2009, Chicago, IL, March 2009.
37. "Nanophotonic resonators as biosensing substrates," Ecole Polytechnique de Montreal, Engineering Physics Department Seminar, March 2009.
38. "Microplate-based, Label-free Applications: Native Cell Profiling and Pharmaceutically Relevant Targets," Society for Biomolecular Screening Annual Meeting, Lille, France, April 2009.
39. "Photonic Biosensors," Electrical Engineering Department Colloquium, University of Washington, Seattle, WA, May 2009.

40. "A general method for screening protein-DNA interactions using photonic crystal biosensor microplates," ACHEMA Conference, Frankfurt, Germany, May 2009.
41. "Deposited nanorod films for biosensor applications," W. Zhang, S.-M. Kim, N. Ganesh, I. Block, P.C. Mathias, and B.T. Cunningham, AVS 56th International Symposium & Exhibition, San Jose, CA, November, 2009.
42. "Screening Small Molecule and Cell-Based Targets using Photonic Crystal Biosensors," B.T. Cunningham, Target Discovery World Congress, San Francisco, CA, August 2009.
43. "Application of Photonic Crystal Enhanced Fluorescence to a Cytokine Immunoassay," B.T. Cunningham, EMBC 2009 Conference, Minneapolis, MN, September 2009.
44. "Photonic crystal enhanced fluorescence," B.T. Cunningham, SPIE Photonics West, San Francisco, CA, January 2010.
45. "Label-Free Cell Assays Using Photonic Crystal Biosensors," Center for Cellular Mechanics Seminar, Urbana, IL, February 2010.
46. "Deposited Nanorod Films for Biosensor Applications," iOptics Seminar, Urbana, IL, February 2010
47. "Biosensors for Cell and Bacteria Surface Interaction Analysis," Department of Medicinal Chemistry Seminar, University of Illinois Chicago, Chicago, IL, March 2010.
48. "Application of biosensors in cancer research and diagnostics," Department of Medicine Seminar, University of Illinois Chicago, Chicago, IL, April 2010.
49. "Fluorescence-based biodetection and fluorescence amplification," NSF Biosensing-Bioactuation Summer Institute 2010, Champaign, IL, July 2010.
50. "Sensors using photonic crystal surfaces," International Nano-Optoelectronics Workshop (iNOW), Beijing, China, August 2010.
51. "Resonant excitation and enhanced extraction of quantum dots in plastic-based photonic crystals," BAE Systems Seminar, Merrimack, NH, September 2010.
52. "Label-free detection and fluorescence enhancement with photonic crystal surfaces," Department of Biopharmaceutical Sciences, College of Pharmacy, University of Illinois at Chicago, October 2010.
53. "Biosensing with Photonic Crystal Surfaces," IEEE Photonics Society 2010 Annual Meeting, Denver, CO, November 2010.
54. "Nanophotonics in Biosensing," 1st International Symposium on Nanomedicine: Past, Present & Future Prospects, Karachi, Pakistan, December 2010.
55. "High resolution imaging of cell activity using photonic crystal surfaces," LEOS Winter Topical Meeting, Keystone, CO, January 2011.
56. "Biosensing with Photonic Crystal Surfaces," University of California Davis, Center for Biophotonics Science and Technology (CBST) Seminar, March 2011.
57. "Sensors for Biomedical Tubing," Nano Electronics-Photonics Seminar, University of Illinois at Urbana-Champaign, April 2011.
58. "Cell-based assays using photonic crystal biosensors," Conference on Lasers and Electro Optics (CLEO), Baltimore, MD, May 2011.
59. "Getting molecules to see the light: Nanostructures and instruments for biomedical detection," Draper Laboratory Seminar, Cambridge, MA, August 2011.
60. "Getting molecules to see the light: Nanostructures and instruments for biomedical detection," Boston University Photonics Center Seminar, Boston MA, August 2011.
61. "Getting molecules to see the light: Nanostructures and instruments for biomedical detection," W.M. Keck Lecture, University of California at Santa Cruz, September 2011.
62. "Photonic Crystals: A versatile platform for optics-based biological detection," SPIE Photonics West, San Francisco, CA, January 2012.
63. "Point of Care Cancer Detection using Silicon Photonic Crystal Enhanced Fluorescence," Intel Research Webinar, March, 2012.
64. "Subwavelength photonics for biosensing," OSA Integrated Photonics Research, Silicon and Nanophotonics Conference, Colorado Springs, CO, June 2012.
65. "Flexible optical nanosensors in disposable biomedical tubing," CMOS Emerging Technologies Conference, Vancouver, BC, July 2012.
66. "Smartphone biosensors for health, environmental monitoring, and food safety," NSF EFRI Program Topic Proposal, Arlington, VA, January 2013.

67. "Application of nanosensors for prevention of food contamination," Illinois Institute of Technology Institute of Food Safety and Health Seminar, Bedford Park, IL, January 2013.
68. "Friendly Photons: Optical Sensors in Life Science and Medicine," National Institute of Standards Technology, Bethesda, MD, June, 2013.
69. "Biosensors in diagnostics, point-of-care monitoring, life science research, and pharmaceutical screening," Austrian Institute of Technology Seminar, Vienna, Austria, July 2013.
70. "Biosensors in diagnostics, point-of-care monitoring, life science research, and pharmaceutical screening," Bionanotechnology Summer Institute, Urbana, IL, August 2013.
71. "Optical Sensors in Drug Discovery," **Keynote Presentation**, 1st Mining the Microbial Genome Symposium, Institute for Genomic Biology, Urbana, IL, August, 2013.
72. "Optical Sensors in Life Science and Medicine," **Tutorial Presentation**, IEEE Photonics Conference, Bellevue, WA, September, 2013.
73. "The biosensor business," Technology Entrepreneurship Program, University of Illinois School of Management, Urbana, IL, September, 2013.
74. "Lighting the Way: Optical Sensors in the Life Sciences," IEEE SmartTech Workshop, Waltham, MA, September, 2013.
75. "Nanostructures in Optics for Biomedicine," Washington University Mechanical Engineering and Material Science Department Seminar, St. Louis, MO, September 2013.
76. "Friendly Photons: Optical Sensors in Life Science and Medicine," Penn State University, Department of Engineering Science and Mechanics Seminar, State College, PA, October 2013.
77. "Friendly Photons: Optical Sensors in Life Science and Medicine," Berkeley Sensor and Actuator Center (BSAC) Seminar, University of California at Berkeley, Berkeley, CA, November 2013.
78. "Friendly Photons: Optical Sensors in Life Science and Medicine," **Keynote Lecture**, International Conference on Sensing Technology, Wellington, New Zealand, December 2013.
79. "Photonic Crystal Enhanced Microscopy: A New Tool for Cell Imaging and Biomarker Detection," Institute of Genomic Biology Seminar, Urbana, IL, January 2014.
80. "Photonic Crystal Enhanced Microscopy: A New Tool for Cell Imaging and Biomarker Detection," University of Houston, Department of Electrical and Computer Engineering Distinguished Speaker Series, **Inaugural Lecture**, Houston, TX, February 2014.
81. "Handheld Smartphone Biosensing," Molecular Medicine Tri-Conference on Point-of-Care Diagnostics, San Francisco, CA, February 2014.
82. "Optical Sensors in Diagnostics and Life Science Research," Beckton Dickenson Technologies Division Seminar, Raleigh, NC, February 2014.
83. "Optical Sensors in the Life Sciences," Tsinghua University-Illinois Nanotechnology Symposium, Urbana, IL, April 2014.
84. "Laser Biosensors for Drug Discovery," 2014 Device Research Conference, Plenary Lecture, Santa Barbara, CA, June 2014.
85. "Four Orders of Magnitude: Nanophotonic Biosensors for Detection of Molecules to Tissues," Plenary Lecture, Asia-Pacific Conference of Transducers and Micro-Nano Technology (APCOT), Daegu, South Korea, June 2014.
86. "Smartphone Biosensors for Diagnostics, Food Safety, and Environmental Monitoring," OSA Applied Industrial Optics Conference, Seattle, WA, July 2014.
87. "Biosensors in Food Safety Applications," Department of Food Science and Human Nutrition, Graduate Seminar, University of Illinois at Urbana-Champaign, Champaign, IL, September 2014.
88. "Smartphone Biosensors for Diagnostics, Food Safety, and Environmental Monitoring," SelectBio Point of Care Diagnostics World Congress, San Diego, CA, September 2014.
89. "Four Orders of Magnitude: Nanophotonic Biosensors for Detection of Molecules to Tissues," Boston University Photonics Seminar, Boston, MA, October 2014.
90. "Photonic crystal biosensors," IEEE Sensors Conference (Special Session on Photonic Crystal Biosensors), Valencia, Spain, November 2014.
91. "Chemical and Biological Detection for Diagnostic, Food Safety, and Drug Safety using the Internal Sensing Capabilities of Mobile Devices," Lester Wolfe Workshop at MIT, Cambridge, MA, November 2014.

92. "Microfluidic Integration of Photonic Crystal Enhanced Fluorescence Technology for High Sensitivity, Multiplexed Detection of Serum Biomarkers," NIH Innovative Molecular Analysis Technologies Program Annual Workshop, Bethesda, MD, November 2014.
93. "Photonic crystals, biomarkers, and cells," IEEE EMBS Micro and Nanotechnology in Medicine Conference, Oahu, HI, December 2014.
94. "Chemical and Biological Detection for Diagnostics using the Internal Capabilities of Mobile Devices," ASME Webinar: How Technology is Transforming Diagnostics, March 2015.
95. "Smartphone biosensors in diagnostics, food safety, and anti-counterfeit drug applications," University of Wisconsin, ECE Department Graduate Seminar, April, 2015.
96. "Smartphone Spectroscopy: Three unique modalities for point-of-care testing," K.D. Long, H. Yu, H. Le, S. Lumetta, and B.T. Cunningham, SPIE Sensing Technology + Applications Conference, Baltimore, MD, April 2015
97. "Nano-biophotonic approaches for detection of chemical molecules, proteins, virus particles, and cells," Keynote Presentation: International Symposium on Organic Electronics and Bioelectronics, Clemson, SC, May 2015.
98. "Teaching your old smartphone new tricks: Mobile biodetection for health and food safety," Saturday Engineering for Everyone, ECE Department at University of Illinois at Urbana-Champaign, May 2015.
99. "Photonic crystal enhanced microscopy," Conference for Lasers and Electro-Optics (CLEO), San Jose, CA, May 2015.
100. "Biosensing lasers using external cavities coupled with photonic and plasmonic crystals," OSA Advanced Photonics Congress, Boston, MA, June 2015.
101. "Smartphone Biosensors: Lab-in-a-Pocket Diagnostics," Central Illinois Section of IEEE Invited Seminar, Champaign, IL, September 2015.
102. "Quantitative imaging of live cell adhesion by photonic crystal enhanced microscopy," MRL Biological Conference, Champaign, IL, November 2015.
103. "To label or not-to-label? That is the question!" OSA Incubator Workshop on Optical Biosensors for Medical Diagnostic Applications, Washington, DC, November 2015.
104. "Photonic crystal enhanced fluorescence: Development of sensors structures and detection instrumentation for early cancer biomarker detection," NIH Innovative Molecular Analysis Technologies Principle Investigator's Meeting, Washington, DC, November 2015.
105. "Photonic crystal enhanced microscopy," Frontiers in Ultrasensitive and Super Resolution Imaging Symposium, Urbana, IL, December 2015.
106. "Photonic crystal enhancement and tuning of quantum dot emission," Dow Chemical Company Seminar, Marlborough, MA, January 2016.
107. "Smartphone biosensors: New tools for nutrition and health diagnostics," American Society for Nutrition Annual Meeting, Special session on innovative techniques to evaluating behavioral nutrition interventions in the community, San Diego, CA, April 2016.
108. "Photonic crystal enhanced microscopy for cell membrane imaging and digital resolution biomolecular sensing," 12th International Symposium on Photonic and Electromagnetic Crystal Structures (PECS), York, UK, July 2016.
109. "Nano-Biophotonic Approaches for Detection of Chemical Molecules, Proteins, Virus Particles, and Cells," ARO/NSF/SRC Technical Exchange Meeting on Cell-Semiconductor Interfaces and Hybrid Semiconductor-Biological Systems, Atlanta, GA, July 2016.
110. "Photonic crystal enhanced microscopy for cell membrane imaging and digital resolution biomolecular sensing," Georgia Tech Mechanical Engineering Department Seminar, Atlanta, GA, July 2016.
111. "Quest for the \$100 genome," Carle Hospital Genomics for Clinicians Conference, Urbana, IL, July 2016.
112. "Recent developments in biophotonics," GE Global Research Seminar, Niskayuna, NY, October 2016.
113. "Point of care diagnostics," Plenary Lecture, Carle Foundation Day Symposium, Champaign, IL, November 2016.
114. "Development of an automated test for an oropharyngeal cancer biomarker in blood using photonic crystal enhanced fluorescence," B.T. Cunningham, C. Race, L. Kwon, H. Inan, S. Kesiraju, K. Anderson, U. Demirci, R. Zangar, Frontiers in Bioengineering Mini Symposium, Zhangjiang Hi-Tech Park, Shanghai, China, November 2016.
115. "Development of an automated test for an oropharyngeal cancer biomarker in blood using photonic crystal enhanced fluorescence," B.T. Cunningham, C. Race, L. Kwon, H. Inan, S. Kesiraju, K. Anderson,

- U. Demirci, R. Zangar, NIH Innovative Molecular Analysis Technologies (IMAT) Program PI Meeting, Bethesda, MD, December 2016.
116. "Photonic crystal enhanced microscopy for cell membrane imaging and digital resolution biomolecular sensing," Biomedical Engineering Department Seminar, Rochester University, Rochester, NY, December 2016.
 117. "Photonic crystal enhanced microscopy: A new tool for cell-surface quantitative imaging and digital resolution biomolecular diagnostics," B.T. Cunningham, Y. Zhuo, J.S. Choi, T. Marin, H. Yu, and B.A. Harley, Emerging Technologies in Communications, Microsystems, Optoelectronics, and Sensors (ET-CMOS), Warsaw, Poland, May 2017.
 118. "Mobile Biosensing using the Capabilities of Smartphone Cameras," B.T. Cunningham, K.D. Long, H. Yu, W.Chen, F. Sun, A. Ornob, A. Ganguli, S. Lumetta, and R. Bashir, IEEE International Microwave Workshop Series on Advanced Materials and Processes, Pavia, Italy, September 2017.
 119. "Photonic biosensor technologies for ultrasensitive, portable applications in gloabl health diagnostics, environmentla monitoring, and life science research ," B.T. Cunningham, K.D. Long, H. Yu, W. Chen, F. Sun, A. Ornob, A. Ganguli, S. Lumetta, and R. Bashir, Illinois-JITRI Institute (IJI) Symposium, Nanjing, China, September 2017.
 120. "Personal diagnostics using the detection capabilities of smartphones," GIANT Health Event, London, UK, November 2017.
 121. "Photonic crystal enhanced microscopy: A new tool for cell-surface quantitative imaging and digital resolution biomolecular diagnostics," University of Birmingham Chemistry Department Seminar, Birmingham, UK, November 2017.
 122. "Biosensing with photonic crystals," Eurotrode Conference, Naples, Italy, March 2018.
 123. "Photonic crystal resonant coupling to nanoantennas and applications for digital resolution biosensing," OSA Biomedical Optics, Hollywood, FL, April 2018.
 124. "Photonic crystal enhanced microscopy of the cellular microenvironment," Subcellular to Cellular Cancer Imaging Workshop, sponsored by teh National Cancer Institute and the American Society for Cell Biology, Bethesda, MD, April 2018.
 125. "Photonic crystal enhanced microscopy of the cellular microenvironment," Subcellular to Cellular Cancer Imaging Workshop, sponsored by teh National Cancer Institute and the American Society for Cell Biology, Bethesda, MD, April 2018.
 126. "Smartphone spectroscopy for mobile health diagnostics with laboratory-equivalent capabilities," SPIE Defense + Commercial Sensing, Orlando, FL, April 2018.
 127. "Digital resolution biomolecule sensing by photonic resonator absorption microscopy (PRAM) with plasmonic nanoparticle tags," Protein Engineering Summit (PEGS) 2018, Special Session: Nanotechnology in Medicine, Boston, MA, May 2018.
 128. "Hybrid dielectric resonator + nanoantenna systems: Principles, detection instruments, and applications in digital resolution biosensing," PIERS 2018, Toyama, Japan, August 2018. Keynote presentation.
 129. "Pathogen sensng and identification using a smartphone," IEEE RAPID Conference, Destin, FL, August, 2018.
 130. "Multiplexed smartphone detection of infectious diseases with microfluidic loop-mediated isothermal amplification," 3rd Microfluidics Congress, San Francisco, CA, September 2018.
 131. "Biosensing with digital resolution for ultrasensitive diagnostics," Texas A&M Biomedical Engineering Department Distinguished Lecture, College Station, TX, September 2018.
 132. "Biosensing with digital resolution for ultrasensitive diagnostics," University of Texas at Austin, Electrical and Computer Engineering Department Seminar, Austin, TX, September 2018.
 133. "Biosensing with digital resolution for ultrasensitive diagnostics," University of Wisconsin, Chemistry Department Seminar, Madison, WI, October 2018.
 134. "New forms of microscopy enabled by nanostructured surfaces," University of California Santa Barbara, Electrical Engineering Distinguished Speaker Seminar, Santa Barbara, CA, October 2018.
 135. "New forms of microscopy enabled by nanostructured surfaces," UCLA, Electrical and Computer Engineering Distinguished Speaker Seminar, Los Angeles, CA, October 2018.
 136. "New forms of microscopy enabled by nanostructured surfaces," Chemical Engineering Department Seminar, University of New Hampshire, Durham, NH, October 2018.
 137. "New forms of microscopy enabled by nanostructured surfaces," Stanford University, Electrical and Computer Engineering Distinguished Speaker Seminar, Palo Alto, CA, October 2018.

138. "Preparing excellent NIH R01 proposals in biosensors and bioinstrumentation," Center of Integrated Biomedical and Bioengineering Research Seminar, University of New Hampshire, Durham, NH, October 2018.
139. "New forms of microscopy enabled by nanostructured surfaces," Electrical Engineering Department Seminar, City University of London, London, England, November 2018.
140. "New forms of microscopy enabled by nanostructured surfaces," Optoelectronics Research Center Seminar, University of Southampton, Southampton, England, November 2018.
141. "New forms of microscopy enabled by nanostructured surfaces," Photonics and Quantum Sciences Research Institute Seminar, Heriot Watt University, Edinburgh, Scotland, November 2018.
142. "New forms of microscopy enabled by nanostructured surfaces," Photonics Research Center Seminar, Ghent University, Ghent, Belgium, November 2018.
143. "Commercialization of smartphone diagnostics," IEEE Micro and Nanotechnology in Medicine Conference, Kauai, HI, December 2018.
144. "Using smartphones to detect disease," Genomics for Journalists Workshop, Carl Woese Institute for Genomic Biology, March 2019.
145. "Ultrasensitive diagnostics using digital resolution bio sensing," Cleveland Chapter of IEEE, April 2019.
146. "Using nanotechnology to realize a working liquid biopsy," Stratum Med Symposium for Genomics in Medicine, Champaign, IL, April 2019.
147. "Using nanotechnology to realize a working liquid biopsy," Mayo Clinic Alliance on Personalized Medicine, Champaign, IL, April 2019.
148. "New forms of microscopy enabled by nanostructured surfaces," MRS Spring Meeting, Phoenix, AZ, April 2019.
149. "Digital resolution genomic and proteomic liquid biopsy using plasmonic-photonic hybrid resonators," Draper Laboratory, Cambridge, MA, September 2019.
150. "Digital resolution genomic and proteomic liquid biopsy using plasmonic-photonic hybrid resonators," Boston University OSA/SPIE Student Chapter Invited Seminar, Boston, MA, September 2019.
151. "Digital resolution genomic and proteomic liquid biopsy using plasmonic-photonic hybrid resonators," Wellman Center Seminar, Massachusetts General Hospital,, Boston, MA, September 2019.
152. "Detection of miRNA by Activate Capture + Digital Counting (AC+DC) Microscopy," T. Canady, N. Li, and B.T. Cunningham, US-Korea Nanotechnology Forum, San Diego, CA, September 2019.
153. "Photonic resonator hybrids for ultrasensitive liquid biopsy of nucleic acid biomarkers for cancer," B.T. Cunningham, T. Canady, N. Li, Q. Huang, C. Che, Y. Lu, and M. Kohli, IEEE Photonics Conference, Tutorial Presentation, San Antonio, TX, September 2019.
154. "Digital resolution genomic and proteomic liquid biopsy using plasmonic-photonic hybrid resonators," UC Santa Cruz Electrical Engineering Distinguished Lecture, October, 2019.
155. "Digital resolution genomic and proteomic liquid biopsy using plasmonic-photonic hybrid resonators," Berkeley Sensor and Actuator Center Lecture, UC Berkeley, October, 2019.
156. "Digital resolution genomic and proteomic liquid biopsy using plasmonic-photonic hybrid resonators," Bay Area Chapter of the IEEE Photonics Society, Santa Clara, CA, October, 2019.
157. "Digital resolution genomic and proteomic liquid biopsy using plasmonic-photonic hybrid resonators," UC San Diego Biomedical Engineering Department Seminar, San Diego, CA, October, 2019.
158. "Digital resolution genomic and proteomic liquid biopsy using plasmonic-photonic hybrid resonators," USC Electrical and Computer Engineering Department Seminar, Los Angeles, CA, October, 2019.
159. "Digital resolution genomic and proteomic liquid biopsy using plasmonic-photonic hybrid resonators," UC Irvine Biomedical Engineering Department Seminar, Irvine, CA, October, 2019.
160. "Digital resolution genomic and proteomic liquid biopsy using plasmonic-photonic hybrid resonators," University of Central Florida CREOL Seminar, Orlando, FL, November, 2019.
161. "Finding needles in a haystack: Liquid biopsy for nucleic acid and protein biomarkers for disease diagnosis." Center for Advanced Studies Noon Hour Presentation, Urbana, IL, February, 2020.
162. "New biosensing paradigms enabled by smartphones, spectroscopy, and photonic metamaterials," Pittcon, Chicago, IL, March, 2020.
163. "Digital resolution biosensing: new approaches in cancer and COVID-19," Carl R. Woese Institute for Genomic Biology, Science Chat, April 2020.
164. "Finding needles in a haystack: Liquid biopsy for nucleic acid and protein biomarkers for disease diagnosis." National Academy of Science, India, Delhi Chapter (delivered virtually), June 2020.

165. "Finding needles in a haystack: Liquid biopsy for nucleic acid and protein biomarkers for disease diagnosis." IEEE EMBS St. Joseph's Institute of Technology, India, (delivered virtually), June 2020.
166. "Novel approaches for breaking the COVID testing bottleneck," JUMP ARCHES COVID Workshop (delivered virtually), Keynote Presentation, September, 2020.
167. "Digital resolution biosensing: New Technology and Applications in Cancer and COVID-19," Mayo Clinic (delivered virtually) CIM/PCT Seminar, January 2021.
168. "Novel approaches for breaking the COVID testing bottleneck, " Zhejiang University-UIUC Center for Pathogen Diagnostics Symposium (virtual), January 2021.
169. "Digital resolution biosensing: New Technology and Applications in Cancer and COVID-19," Nazarbayev University, Kazakhstan (delivered virtually), March 2021.
170. "Photonic metamaterial surfaces for digital resolution biosensor microscopies using enhanced absorption, scattering, and emission," SPIE Photonics West (delivered virtually), March 2021.
171. "Biosensor diagnostics: Transitioning from personalized medicine to personalized nutrition," Frontiers in Nutritional Science Lecture Series, Center for Personalized Nutrition, University of Illinois at Urbana-Champaign (delivered virtually), March 2021.
172. "Applications of photonic resonator absorption microscopy," Mayo Clinic Precision Cancer Therapeutics Retreat, Rochester, MN (delivered virtually), August 2021.
173. "Novel microscopies and digital resolution biosensor diagnostics using photonic metamaterial surfaces," National Institutes of Standards and Technology, Biophysical and Biomedical Measurement Seminar, (delivered virtually), October, 2021.
174. "Digital resolution liquid biopsy at the point of care," SelectBIO Point of Care Diagnostic Biosensors Conference, Coronado Island, CA, December 2021.
175. "Photonic resonator interferometric scattering microscopy," SPIE Photonics West, San Francisco, CA, January 2022.
176. "Cancer measurement at the point of care," VinFuture Prize Innovatalk, VinFuture Webinar Series, (delivered virtually), July 2022.
177. "Cancer measurement at the point of care using nanophotonics," Optical MEMS and Nanophotonics Conference, Keynote Presentation, (delivered virtually), September 2022.
178. "Cancer liquid biopsy at the point of care," Early Detection of Cancer Conference, Portland, OR, October 2022.
179. "Ultrasensitive quantification of molecular biomarkers using digital resolution technology," Individualizing Medicine Conference, Mayo Clinic, Rochester, MN, November 2022.
180. "Ultrasensitive detection of cancer and pathogens using the power of nanophotonics," EPFL Careers in Photonics, Lausanne, Switzerland, November 2022.
181. "Ultrasensitive and ultrasensitive liquid biopsy: Nanophotonics-driven digital resolution biosensing," SPIE Photonics West, San Francisco, CA, January 2023 (Keynote Presentation)
182. "Nanophotonics-driven digital resolution biomolecule sensing combined With target molecule recycling," Stanford Canary Center for Early Cancer Detection seminar, Palo Alto, CA, April 2023.
183. "Nanophotonics-driven digital resolution biomolecule sensing combined With target molecule recycling," OSF Hospital Cancer Clinical Seminar, Peoria, IL, May 2023.
184. Biosensors Summer School, VinUniversity, Hanoi, Vietnam, July 2023.
185. "Digital resolution biosensing using photonic crystal enhanced fluorescence and quantum dot tags," Hanoi University of Science and Technology, Material Science Department Seminar, July 2023.
186. "Liquid biopsy technology in neurological disease," Mayo Clinic Neuroscience Seminar, Jacksonville, FL, August 2023.
187. "Nanophotonics-driven digital resolution biomolecule sensing combined With target molecule recycling," iOptics Seminar, Urbana, IL, August 2023.
188. "Advancing cancer biomarker detection," Drug Discovery Network (DDN) webinar, September 2023.
189. "Digital resolution detection without droplets or enzymes through photonic crystal amplification," SelectBIO Lab on a Chip and Microfluidics World Congress, Laguna Hills, CA, November 2023.
190. "Ultrasensitive digital molecular and viral assays for point of care diagnosis using photonic crystal biosensor microscopy," SelectBIO Emerging Technologies & Paradigms for In Vitro Dx Europe, Rotterdam, Netherlands, March 2024.

US Patents Issued (Pending applications and foreign applications not listed):

1. 5,399,897 Microstructure and method of making such structure (B.T. Cunningham and P.V. Richard), March 21, 1995
2. 5,688,699 Microbolometer (B.T. Cunningham and B. Patel) November 18, 1997.
3. 5,900,630 Radiation detection apparatus (T.T. Tang, B.T. Cunningham, D.L. Lee, R.F. Adams, and S. Liberman) May 4, 1999.
4. 6,168,906 Micromachined membrane with locally compliant and stiff regions and method of making same (B.T. Cunningham and J.J. Bernstein) January 2, 2001.
5. 5,903,383 Electrostatic memory micromirror display system (J. Bernstein and B.T. Cunningham) May 11, 1999.
6. 6,688,158 Flexural plate wave sensor and array (B.T. Cunningham and J.R. Williams) February 10, 2004.
7. 6,837,097 Flexural plate wave sensor and array (B.T. Cunningham and J.R. Williams) January 4, 2005.
8. 6,851,297 Flexural plate wave sensor and array (B.T. Cunningham and J.R. Williams) February 8, 2005.
9. 6,951,715 Optical detection of label-free biomolecular interactions using microreplicated plastic sensor elements (B.T. Cunningham, J. Pepper, B. Lin, P. Li, H. Pien, and J. Qiu) October 4, 2005.
10. 6,990,259 Photonic crystal defect cavity biosensor (B.T. Cunningham) January 24, 2006.
11. 7,000,453 Flexural plate wave sensor and array (B.T. Cunningham and J.R. Williams) February 21, 2006.
12. 7,023,544 Method and instrument for detecting biomolecular interactions (B.T. Cunningham and P. Li) April 4, 2006.
13. 7,070,987 Guided mode resonant filter biosensor using a linear grating surface structure (B.T. Cunningham, J. Pepper, B. Lin, P. Li, J. Qiu, and H. Pien) July 4, 2006.
14. 7,074,311 Biosensor electrophoresis (B.T. Cunningham) July 11, 2006.
15. 7,094,595 Label-free high-throughput optical technique for detecting biomolecular interactions (B.T. Cunningham, J. Pepper, B. Lin, P. Li, and H. Pien) August 22, 2006.
16. 7,101,660 Method for producing a colorimetric resonant reflection biosensor on rigid surfaces (B.T. Cunningham and J. Qiu) September 5, 2006.
17. 7,109,633 Flexural plate wave sensor (M.S. Weinberg, B.T. Cunningham, and E. Hildebrandt) September 19, 2006.
18. 7,118,710 Label-free high-throughput optical technique for detecting biomolecular interactions (B. T. Cunningham) October 10, 2006.
19. 7,142,296 Method and apparatus for detecting biomolecular interactions (B.T. Cunningham, P.Y. Li, and F. DeFilippi) November 28, 2006.
20. 7,148,964 Method and apparatus for detecting biomolecular interactions (B.T. Cunningham, P.Y. Li, and F. DeFilippi) December 12, 2006.
21. 7,153,702 Label-free methods for performing assays using a colorimetric resonant reflection optical biosensor (B. Lin, J. Pepper, B.T. Cunningham, J. Gerstenmaier, P. Li, J. Qiu, and H. Pien) December 26, 2006.
22. 7,158,230 Method and apparatus for detecting biomolecular interactions (B.T. Cunningham, P.Y. Li, and F. DeFilippi) January 2, 2007.
23. 7,170,599 Method and instrument for detecting biomolecular interactions (B.T. Cunningham and P.Y. Li) January 30, 2007.
24. 7,171,844 Apparatus and method for measuring the mass of a substance (B.T. Cunningham and J.R. Williams) February 6, 2007.
25. 7,175,980 Method of making a plastic colorimetric resonant biosensor device with liquid handling capabilities (J. Qiu, P.Y. Li, and B.T. Cunningham) February 13, 2007.
26. 7,197,198 Biosensor substrate structure for reducing the effects of optical interference (S.C. Schulz and B.T. Cunningham) March 27, 2007.
27. 7,202,076 Label-free high-throughput optical technique for detecting biomolecular interactions (B.T. Cunningham, J. Pepper, B. Lin, P.Y. Li, and H. Pien) April 10, 2007.
28. 7,217,574 Method and apparatus for biosensor spectral shift detection (H. Pien, W.C. Karl, D. Puff, P.Y. Li, and B.T. Cunningham) May 15, 2007.
29. 7,264,973 Label-free methods for performing assays using a colorimetric resonant optical biosensor (B. Lin, B.T. Cunningham, and P.Y. Li) September 4, 2007.
30. 7,266,990 Flexural plate wave sensor and array (B.T. Cunningham and J.R. Williams), September 17, 2007.

31. 7,292,336 Method and instrument for detecting biomolecular interactions (B.T. Cunningham and P.Y. Li) November 6, 2007.
32. 7,298,477 Method and apparatus for detecting biomolecular interactions (B.T. Cunningham, P.Y. Li, and F. DeFilippi) November 20, 2007.
33. 7,300,803 Label-free methods for performing assays using a colorimetric resonant reflectance optical biosensor (B. Lin, J. Pepper, B.T. Cunningham, J. Gerstenmaier, P.Y. Li, J. Qiu, and H. Pien) November 27, 2007.
34. 7,300,814 Method for fabricating micro-mechanical devices (B.T. Cunningham and M.S. Weinberg) November 27, 2007.
35. 7,301,628 Method and apparatus for detecting biomolecular interactions (B.T. Cunningham, P.Y. Li, and F. DeFilippi) November 27, 2007.
36. 7,309,614 Self-referencing biodetection method and patterned bioassays (C. Baird, B.T. Cunningham, P. Li) December 18, 2007.
37. 7,312,090 Label-free methods for performing assays using a colorimetric resonant reflectance optical biosensor (B. Lin, J. Pepper, B.T. Cunningham, J. Gerstenmaier, P. Li, J. Qiu, and H. Pien) December 25, 2007.
38. 7,327,454 Method and apparatus for detecting biomolecular interactions (B.T. Cunningham, P.Y. Li, F. DeFilippi) February 5, 2008.
39. 7,371,562 Guided mode resonant filter biosensor using a linear grating surface structure (B.T. Cunningham, J. Pepper, B. Lin, P. Li, J. Qiu, H. Pien) May 13, 2008.
40. 7,422,891 Label-free high-throughput optical technique for detecting biomolecular interactions (B.T. Cunningham) September 9, 2008.
41. 7,468,138 Flexural plate wave sensor (M.S. Weinberg, B.T. Cunningham, and E. Hildebrandt) December 23, 2008.
42. 7,479,404 Photonic crystal biosensor structure and fabrication method (B.T. Cunningham, I. Block, L. L-Y. Chan) January 20, 2009.
43. 7,497,992 Detection of biochemical interactions on a biosensor using tunable filters and tunable lasers (B.T. Cunningham, P.Y. Li, C. Chang-Hasnain, C. Mateus) March 3, 2009.
44. 7,521,769 Photonic crystal biosensor and fabrication method (B.T. Cunningham) April 21, 2009.
45. 7,531,786 Photonic crystal sensors with integrated fluid containment structure (B.T. Cunningham and C.J. Choi) May 12, 2009.
46. 7,534,578 Self-referencing biodetection method and patterned bioassays (C. Baird and B.T. Cunningham) May 19, 2009.
47. 7,575,939 Optical detection of label-free biomolecular interactions using microreplicated plastic sensor elements (B.T. Cunningham, J. Pepper, B. Lin, P. Li, H. Pien, and J. Qiu), August 18, 2009.
48. 7,611,836 Method of making a plastic colorimetric resonant reflection biosensor on rigid surfaces (J. Qiu, P. Li, and B.T. Cunningham), November 3, 2009.
49. 7,615,339 Method for producing a colorimetric resonant reflection biosensor on rigid surfaces (B.T. Cunningham and J. Qiu), November 10, 2009.
50. 7,622,027 Biosensor electrophoresis (B.T. Cunningham) November 24, 2009.
51. 7,718,440 Method and apparatus for biosensor spectral shift detection, (H. Pien, W.C. Karl, D. Puff, P. Li, and B.T. Cunningham), May 18, 2010.
52. 7,737,392 Photonic crystal sensors with integrated fluid containment structure, sample handling devices incorporating same, and used thereof for biomolecular interaction analysis, (B.T. Cunningham and C.J. Choi), June 15, 2010.
53. 7,742,662 Photonic crystal sensors with integrated fluid containment structure, (B.T. Cunningham) June 22, 2010.
54. 7,756,365 Near ultraviolet-wavelength photonic-crystal biosensor with enhanced surface to bulk sensitivity ratio (B.T. Cunningham, N. Ganesh, and I.D. Block) July 13, 2010.
55. 7,768,640 Fluorescence detection enhancement using photonic crystal surfaces (B.T. Cunningham, N. Ganesh, P.C. Mathias, and I.D. Block) August 3, 2010.
56. 7,768,640 Grating-based sensor combining label-free binding detection and fluorescence amplification and readout system for sensor (B.T. Cunningham, P.Y. Li, L.G. Liang, G. Jogikalmath) September 7, 2010.
57. 7,790,406 Grating-based sensor combining label-free binding detection and fluorescence amplification and readout system for sensor (B.T. Cunningham, P.Y. Li, L.G. Liang, G. Jogikalmath) September 7, 2010.

58. 7,854,505 Passive and active photonic crystal structures and devices (B.T. Cunningham and D.W. Dobbs) December 21, 2010.
59. 7,869,032 Biosensors with Porous Dielectric Surface for Fluorescence Enhancement and Methods of Manufacture, (W. Zhang and B.T. Cunningham) January 11, 2011.
60. 7,961,315 Fluorescence detection enhancement using photonic crystal extraction (B.T. Cunningham, N. Ganesh, P.C. Mathias, and I.D. Block) June 14, 2011.
61. 7,863,052 Grating-based sensor combinign label-free binding detection and fluorecence amplification and readout system for sensor, (S.C. Schulz, B.T. Cunningham, L.G. Laing, P.Y. Li, B. Binder, G. Jogikalmath, and A. Borsody), January 4, 2011.
62. 7,875,434 Label-free methods for performing assays using a colorimetric resonant reflectance optical biosensor, (B. Lin, B.T. Cunningham, P. Li), January 25, 2011.
63. 7,923,239 Guided mode resonant filter biosensor using a linear grating surface structure (B.T. Cunningham, P. Li, J. Qiu, and H. Pien), April 12, 2011.
64. 7,927,789 Self-referencing biodetection method and patterned bioassays, (C. Baird, B.T. Cunningham, and P. Li), April 19, 2011.
65. 7,935,520 Optical detection of label-free biomolecular interactions using microreplicated sensor elements (B.T. Cunningham, J. Pepper, B. Lin, P. Li, H. Pien, and J. Qiu), May 3, 2011.
66. 7,960,170 Grating-based sensor combining label-free binding detection and fluorecence amplification and readout system for sensor (S.C. Schulz, B.T. Cunningham. L.G. Laing, P.Y. Li, B. Binder, G. Jogikalmath, A. Borsody, June 14, 2011.
67. 7,968,836 Photonic crystal sensors with integrated fluid containment structure, sample handling devices incorporating same, and uses thereof for biomolecular interaction analysis (B.T. Cunningham and C. Choi), June 28, 2011
68. 8,101,423 Label-free high-throughput optical technique for detecting bimolecular interactions (B.T. Cunningham, J. Pepper, B. Lin, P. Li) January 24, 2012.
69. 8,247,240 Method and apparatus for biosensor spectral shift detection (H. Pien, W.C. Karl, D. Puff, P. Li, and B.T. Cunningham) August 21, 2012.
70. 8,268,637 Label-free biosensors based upon distributed feedback laser (B.T. Cunningham and M. Lu) September 18, 2012.
71. 8,298,780 Method of detection of changes in cells (R. Wagner, R. Fernandez, B.T. Cunningham, L. Laing) October 30, 2012.
72. 8,344,333 Multi-color fluorescence enhancement from a photonic crystal surface (M. Lu, B.T. Cunningham, A. Pokhriyal) January 1, 2013.
73. 8,384,892 Surface enhanced Raman spectroscopy on optical resonator (e.g., photonic crystal) surfaces (B.T. Cunningham), February 26, 2013.
74. 8,497,631 Polymer microcavity and microchannel devices and fabrication method (J.G. Eden, S.-J. Park, M. Lu, and B.T. Cunningham), July 30, 2013.
75. 8,580,578 Optical detection of label-free biomolecular interactions using micro replicated plastic (B.T. Cunningham, J. Pepper, B Lin, P. Li, H. Pien, J. Qiu), November 12, 2013.
76. 8,593,630 Discrete frequency spectroscopy and instrumentation (R. Bhargava and B.T. Cunningham), November 26, 2013.
77. 8,687,187 Surface enhanced Raman spectroscopy on optical resonator (e.g. photonic crystal) surfaces (B.T. Cunningham), April 1, 2014.
78. 8,864,542 Polymer microcavity and microchannel device and array fabrication method (J.E. Eden, S.-J. Park, M. Lu, and B.T. Cunningham), October 21, 2014.
79. 8,947,656 Smartphone biosensor (B.T. Cunningham), February 3, 2015.
80. 8,953,159 Surface enhanced Raman spectroscopy nanodome biosensors and method of manufacturing the same (B.T. Cunningham, C.J. Choi, S.R. Watkins) February 10, 2015.
81. 9,185,200 Smartphone Biosensor (B.T. Cunningham) November 10, 2015.
82. 9,272,126 Photonic biosensors incorporated into tubing, methods of manufacture, and instruments for analyzing the biosensors (B.T. Cunningham, C.J. Choi, A.R. Watkins), March 1, 2016.
83. 9,400,353 Silicon-based photonic crystal fluorescence enhancement and laser line scanning instrument (B.T. Cunningham, S. George, A. Pokhriyal, V. Chaudhery, and M. Lu), July 26, 2016.
84. 9,478,713 Nanostructure material methods and devices (B.T. Cunningham, G.G. See, P. Trefonas, J.K Park, K. Deshpande, J. Zhang, and J. Joo), October 25, 2016.

85. 9,829,435 External cavity laser biosensor arrangements, (M. Lu, C. Ge, and B.T. Cunningham), November 28, 2017.
86. 9,927,556 Nanostructure material methods and devices, (B.T. Cunningham G.G. See, P. Trefonas, J. Zhang, J.K. Park, K. Howard, K. Deshpande, K. Ewers), March 27, 2018.
87. 10,605,735 Photonic resonator outcoupler microscopy (PROM), B.T. Cunningham, B.A. Harley, T. Marin, Y. Zhuo, J.S. Choi, March 31, 2020.
88. 11,041,187 Photonic resonator absorption microscopy (PRAM) for digital resolution biomolecular diagnostics, B.T. Cunningham, B. Harley, S. Singamaneni, Y. Lu, Y. Zhuo, J. Choi, T. Marin, June 22, 2021.
89. 11,150,131 Mobile biosensing instrument capable of multiple detection modalities, B.T. Cunningham and K.D. Long, October 19, 2021.
90. 11,175,222 Integrated Spectroscopic Analysis System with Low Vertical Height for Measuring Liquid or Solid Assays, November 16, 2021.
91. 11,591,640 Photonic Resonator Absorption Microscopy (PRAM) for Digital Resolution Biomolecular Diagnostics, February 28, 2023.
92. 11,654,429 System for Rapid, Portable, and Multiplexed Detection and Identification of Pathogen Specific Nucleic Acid Sequences, May 23, 2023.

Other Professional Activities and Service:

1. Journal Reviewer for *Analytical Chemica Acta*, *Nanotechnology*, *Optics Communications*, *Optics Express*, *Optics Letters*, *Applied Physics Letters*, *Lab on a Chip*, *Analyst*, *Sensors and Actuators*, *IEEE Sensors Journal*, *ACS Nano*, *Biosensors & Bioelectronics*, *IEEE Transactions on Lightwave Technology*, *Nano Letters*, *Small*, *Applied Optics*, *IEEE Sensors*, *Light: Science & Applications*, *Nature Nanotechnology*, *Nature Communications*, *Scientific Reports*, *Advanced Optical Materials*
2. NSF Review Panel, Biophotonics, 2000, 2004, 2005, 2006, 2010, 2011, 2019
3. NSF SBIR Review Panel, 2005
4. ASTAR Review Panel, Biosensors, 2005
5. IEEE Sensors Council, Executive Committee, Secretary and Treasurer, 2008-2009
6. NSF Site Review, Biophotonics Center at UC Davis, 2005, 2006, 2009
7. UIUC Senate, 2005-2007, 2009-2011, 2016-2018
8. Executive Search Committee, Electrical and Computer Engineering Department Head, University of Illinois, 2009.
9. IEEE Sensors Council, Executive Committee, VP of Finance 2009-2011
10. UIUC ECE Department Fellowship Awards Committee, 2005-2009
11. NIH Challenge Grant Review Panel, 2009
12. UIUC ECE Department Curriculum Committee, 2005-2007, 2012-2013
13. NIH Review Panel, Instrumentation and System Development, October 2007, February 2008, permanent member (5-year term) 2010-2015
14. Chair, Biomedical Imaging, Bioengineering, and Acoustics Area Committee, UIUC, 2009-2011
15. College of Engineering Leadership Forum, 2011
16. College of Engineering Executive Committee, University of Illinois at Urbana-Champaign, 2009-2012
17. Search Committee, Executive Associate Dean, UIUC College of Engineering, 2013
18. Program Chair, IEEE Photonics Conference BIO, 2013, 2014
19. Program Committee, SPIE Photonics West Biophotonics, 2014-2016
20. Executive Search Committee, Bioengineering Department Head, University of Illinois, 2013.
21. Executive Search Committee, ECE Department Head, University of Illinois, 2014.
22. Chair, NIH Review Panel, Instrumentation and System Development, 2012-2014
23. Associate Editor, IEEE Photonics Society Newsletter, 2014-2018
24. NSF Workshop on Food Safety for Global Supply Chains, Chair, 2014
25. Chair, NIH Study Section, Pediatric Sensor Development Special Emphasis Panel, 2015
26. NSF Biophotonics CAREER Proposal Review Panel, 2015, 2016, 2020
27. College of Engineering Budget Task Force, 2015
28. Co-Chair, OSA Incubator Workshop on Optical Biosensors for Medical Diagnostic Applications, 2015
29. NIH SBIR proposal review panel, special topic: high throughput drug discovery microplate technologies, 2015

30. External reviewer, Wayne State University microfabrication laboratory, 2015
31. Executive Search Committee, UIUC Materials Research Laboratory Director, 2016
32. External reviewer, Brigham Young University ECE Department, 2016
33. NIH Review Panel: Innovative Molecular Analysis Technologies, 2019
34. Health Care Engineering System Center (HCESC) Steering Committee, 2018-present
35. Theme Leader: Carl R. Woese Institute for Genomic Biology, Center for Genomic Diagnostics, 2017-present
36. Carl R. Woese Institute for Genomic Biology Executive Committee, 2017-present
37. Illinois Cancer Center, Program Leader, Cancer Measurement and Data Science, 2018-present
38. Illinois Cancer Center, Steering Committee, 2018-present
39. Carle-Illinois College of Medicine, Instructor, Infection & Immunity, 2019-2020
40. Center for Pathogen Diagnostics, Co-Director, 2020-present
41. NIH Review Panel: Special Emphasis, Instrumentation and System Development, 2022
42. NIH SBIR Review Panel: HIV Viral Load Self Testing Technologies, 2023
43. NIH SBIR Review Panel: HBV Diagnostic Technologies, 2023

Teaching and Advising:

- Supervision of 30 MS Thesis
- Supervision of 29 awarded PhD Theses (ECE, MatSE, Physics, BioE)
- >90 undergraduate research interns
- Supervision of 25 postdocs or visiting scientists (6 current faculty)
- Instruction of ~800 students for ECE329, ECE485, ECE416, BioE502, BioE572, ECE598

M.S. Thesis Students Completed (University of Illinois at Urbana-Champaign)

1. Ian Block	MS ECE	2006
2. Leo Chan	MS ECE	2006
3. Dennis Dobbs	MS ECE	2006
4. Charles Choi	MS ECE	2007
5. Gregory Slavic	MS MatSE	2007
6. Maria Pineda	MS BioE	2007
7. Gary Yen	MS ECE	2008
8. Fuchyi Yang	MS ECE	2008
9. Sherine George	MS BioE	2008
10. Kashif Altaf	MS ECE	2009
11. Hsin-Yu Wu	MS, ECE	2009
12. Chun Ge	MS ECE	2010
13. Erich Lidstone	MS BioE	2010
14. Anja Kohl	MS Chem	2010
15. Alysia Belobraydich	MS ECE	2009
16. Allen Chu	MS ECE	2011
17. Yafang Tan	MS ECE	2011
18. James Polans	MS ECE	2012
19. William Goldshag	MS ECE	2013
20. Haisheng Xu	MS ECE	2014
21. Chenqi Zhu	MS ECE	2014
22. Kenny Long	MS BioE	2014
23. Tiantian Tang	MS ECE	2015
24. Myles Foreman	MS ECE	2016
25. Qinglan Huang	MS ECE	2017
26. Fu Sun	MS ECE	2017
27. Lydia Kwon	MS BioE	2018
28. Nantao Li	MS ECE	2019
29. Weijing Wang	M.Eng. Bioe	2019
30. Suhas Badella	MS ECE	2020

31. Priyash Barya	MS ECE	2022
32. Sydney Khemtonlang	MS BioE	2024

Ph.D. Thesis Students Completed and placement (University of Illinois at Urbana-Champaign)

1. Leo Chan	ECE	2008	Nexcelom
2. Ian Block	ECE	2009	LS Instruments
3. Meng Lu	ECE	2009	Faculty: Iowa State University
4. Wei Zhang	ECE	2009	Canon
5. Patrick Mathias	BioE	2009	Medical school
6. Nikhil Ganesh	MatSE	2009	Intel
7. Fuchyi Yang	ECE	2010	KLA-Tencor
8. Charles Choi	ECE	2011	NIST
9. Sherine George	BioE	2013	Maxim Semiconductor
10. Anusha Pokhriyal	Physics	2013	Glow Semiconductor
11. Hsin-Yu Wu	ECE	2013	Postdoc: National University of Singapore
12. Vikram Chaudhery	ECE	2012	McKinsey Consulting
13. Erich Lidstone	BioE	2012	Medical school
14. Chun Ge	ECE	2013	Hitachi
15. Yafang Tan	ECE	2014	Lam Research
16. Gloria See	ECE	2015	Mantel Technologies
17. Jui-Nung Liu	ECE	2015	Postdoc: University of Illinois Urbana-Champaign
18. Yue Zhuo	BioE	2015	Postdoc: Harvard Wellman Lab for Photomedicine
19. Meng Zhang	Physics	2015	Apple Computer
20. Weili Chen	ECE	2017	Apple Computer
21. Hojeong Yu	ECE	2017	Postdoc: Harvard University
22. Kenneth Long	BioE	2018	Illinois Medial Scholars Program MD/PhD
23. Caitlin Race	ECE	2018	3M
24. Qinglan Huang	ECE	2020	Postdoc: Stanford University
25. Fu Sun	ECE	2021	Alphabet
26. Nantao Li	ECE	2022	Apple Computer
27. Congnyu Che	BioE	2022	Sanofi
28. Yanyu Xiong	ECE	2024	Stanford
29. Weijing Wang	BioE	2024	

Current Ph.D. Students

1. Skye Shepherd	BioE	Expected completion 2025
2. Han Keun Lee	ECE	Expected completion 2025
3. Joseph Tibbs	BioE	Expected completion 2025
4. Weinan Liu	ECE	Expected completion 2026
5. Leyang Liu	ECE	Expected completion 2026
6. Amanda Bacon	BioE	Expected completion 2027
7. Takhmina Ayupova	BioE	Expected completion 2027
8. Huyen Nguyen	ECE	Expected completion 2028
9. Anqi Tan	BioE	Expected completion 2028
10. Wang Chien Chen	ECE	Expected completion 2029

Postdoctorate and Visiting Scientists Supervised

1. Joel Carlson	Visitor	2006	US Army Natick Soldier System Center
2. Gilles Rasigade	Visitor	2007	University of Lille, France
3. Laurent Aouad	Visitor	2007	University of Lille, France
4. Seok-min Kim	Postdoc	2008-2009	Faculty: Chung-Ang University, S. Korea

5. Regis Mejjard	Visitor	2008	University of Lille, France
6. Cheng-Sheng Huang	Postdoc	2009-2010	Faculty: National Taiwan University
7. Pabritra Nath	Visitor	2011	Faculty: Tezpur University, India
8. Xiangwei Zhao	Postdoc	2011	State Key Laboratory, Bioelectronics, Nanjing CN
9. Meng Lu	Postdoc	2011-2012	Faculty: Iowa State University
10. Diego Ortin	Visitor	2012-2013	Spain
11. Peng Wang	Visitor	2014	Huazhong University of Science & Technology
12. Mengfan Wang	Visitor	2014	Faculty: Tianjin University
13. Yuhang Wan	Visitor	2015-2016	Beihang University
14. Jui-Nung Liu	Postdoc	2015-2017	Faculty: National Cheng Kung University, Taiwan
15. Yue Zhuo	Postdoc	2014-2019	Beckman Postdoc Fellowship
16. Miguel Pastor	Visitor	2017-2019	University d'Alicant, Spain
17. Taylor Canady	Postdoc	2017- 2020	IGB Fellow
18. Young-Gu Ju	Visitor	2018	Faculty on sabbatical, S. Korea
19. Qi Wang	Visitor	2018-2019	Faculty on sabbatical, China
20. Hongyun Gao	Visitor	2018-2019	Faculty on sabbatical, China
21. Hanyuan Zhang	Postdoc	2019-2020	Industry
22. Bin Zhao	Postdoc	2019-2021	U. British Columbia, Vancouver
23. Shreya Ghosh	Postdoc	2019-2021	Industry
24. Xiaojing Wang	Postdoc	2020-2023	
25. Lifeng Zhou	Postdoc	2021-2023	Peking University
26. Anh Igarashi	Visitor	2022	Tohoku University, Japan
27. Seemesh Bhaskar	Postdoc	2023-	

Courses Taught, Degree Programs Established, and Outreach:

- ECE329 Introduction to Electromagnetics
- ECE/MechSE485 Introduction to Microelectromechanical Systems
- ECE/BioE416 Biosensors (Course Founder)
- BioE502 Bioengineering Professionalism
- BioE571 Biological Measurement I (Course Founder)
- BioE572 Biological Measurement II (Course Founder)
- M.Eng. Bioinstrumentation Program (Program Founder) <http://bioinstrumentation.illinois.edu>
- "Lessons on Light" laboratory demonstrations and lectures for Campus Middle School for Girls
- Girls Learn Electrical Engineering (GLEE) summer school instructor: light-based biosensors
- Saturday Engineering for Everyone: Smartphone Biosensors: A Lab in Your Pocket
- Biophotonics Summer School instructor
- ECE416 on NanoHub (<https://nanohub.org/resources/16705>), >38,000 unique users
- ECE598BC – Advanced Biosensors

Research Grants (totaling \$50,859,000 from 2004-2024):

1. Optical Biosensors, SRU Biosystems, 2004-2011, PI, \$1,745,000
2. Photonic Crystal Biosensors, NSF, 2004-2007, PI, \$365,000
3. Tunable Wavelength Laser Visor, Army, 2005-2006, PI, \$51,000
4. Integration of Photonic Crystal Sensors with Nanofluid Flow Channels, NSF NanoCEMMS, 2005-2008, PI, \$171,000
5. Photonic Crystal Wavelength-Selective Tunable Filters for Laser Eye Shielding, Army, 2006-2008, PI, \$177,000
6. Nanofibrous Scaffolds for Cartilage Engineering, Beckman Institute, 2006-2008, 50% co-PI, \$198,000
7. Label-Free, High-Throughput Small Molecule Screening using Photonic Crystal Technology: Application to the Apoptotic Pathway, NIH R01, 2006-2008, 50% co-PI, \$550,000
8. Soybean Rust Biosensor, Soybean Disease Biotechnology Center, 2006-2009, 50% co-PI, \$78,000
9. Pioneering Bionanosensing Systems for Use as a Decision Support Tool for Soybean Rust Management, USDA-CSREES, 2006-2009, 50% co-PI, \$200,000
10. 3M Nontenured Faculty Grant, 3M Corporation, 2007, PI, \$15,000
11. Nanomedicine for Cancer Research, USAID, 2007-2010, 33% co-PI, \$250,000

12. Photonic Crystal Enhanced Fluorescence, NSF, 2008-2013, PI, \$365,000
13. Optical nanofilter-based spectroscopic imaging for prostate histopathology, Siteman Center, 2008, 50% co-PI, \$45,000
14. Micro and Nano-mediated 3D Cardiac Tissue Engineering, USAMMRD, 2008-2013, 20% co-PI, \$2,546,000
15. Acquisition of a Step-and-Flash Nanolithography System, NSF MRI, 2009-2011, PI, \$815,025
16. Photonic Crystal Surfaces for Label-Free Detection and Enhanced Fluorescence, NIH R01, 2009-2013, 50% co-PI, \$1,165,615
17. High Throughput Small Molecule Screening using Photonic Crystal Technology: Application to the Apoptotic Pathway, NIH R01, 2010-2015, 50% co-PI, \$1,767,173
18. Development of Distributed Feedback Laser Biosensor Technology as a High Throughput Screening Technique, NIH R21, 2010-2012, 50% co-PI, \$405,668
19. Development of Practical Mid Infrared Spectroscopic Imaging Technology for Cancer Diagnosis, NIH R01, 2010-2014, 50% co-PI, \$1,879,397
20. Photonic Crystal Surfaces for Label-Free Detection and Enhanced Fluorescence: Application to Protein Microarrays, NIH ARRA R01, 2010-2012, 50% co-PI, \$590,000
21. Optical Downconversion using Photonic Crystals with Embedded Quantum Dots, BAE Systems, 2009-2010, PI, \$60,000
22. NSF Industry/University Cooperative Research Center: Center for Agricultural, Biomedical, and Pharmaceutical Nanotechnology (CABPN), NSF, 2011-2016, Director, 20% co-PI, \$1,950,000
23. External Cavity Laser Biosensor for Label-Free and Enhanced Fluorescence Detection, NSF, 2011-2014, PI, \$366,000
24. Photonic Crystal Enhanced Microscopy for Characterization of Cell Attachment, NSF, 2011-2014, PI, \$450,000
25. Transformative Electronic Materials, Dow Chemical Company, 2011-2016, 15% co-PI, \$3,650,000
26. SERS Nanodomes for Drug Detection in Biomedical Tubing, Baxter, 2012-2014, 50% co-PI, \$200,000
27. Multimode Smartphone Biosensor, NSF, 2013-2016, 50% co-PI, \$600,000
28. Photonic crystal enhanced fluorescence: Development of sensor structures and detection instrumentation for multiplexed biomarker detection, NIH-NCI, 2013-2016, 90% co-PI, \$719,000
29. Rapid Disease Diagnostics using Photonic Crystal Enhanced Antigen Biomarker Microarrays, NIH-NIGMS, 2014-2019, \$2,987,942, 50% co-PI.
30. Lab-in-a-Smartphone, NSF EAGER, 2014-2017, \$300,000, 50%, co-PI
31. DIBBS: Timely and Trusted Curator and Coordinator Data Building Blocks, NSF 2014-2017, \$1,500,000, 20%, co-PI.
32. Multicavity Photonic Crystal Enhanced Fluorescence and SERS, NSF, 2015-2018, 75% co-PI, \$635,000.
33. Label-free interrogation of heterogeneities in HSC fate decision signatures, NIH R21, 2015-2017, 33% co-PI, \$420,000.
34. Pathtracker: A smartphone-based system for mobile infectious disease detection and epidemiology, NSF, 2015-2018, PI, \$1,000,000
35. Smartphone-based infectious disease monitoring system, Qualcomm, PI, \$50,000
36. Portable diagnostic for HIV viral load monitoring using photonic crystal biosensors, NIH R01, 2017-2021, co-PI, \$1,600,000
37. Smartphone thin layer chromatography, Management Sciences for Health, 2016-2017, PI, \$200,000
38. Personalized multiplexed molecular diagnostics for point of care sensing, Massachusetts General Hospital, 2016-2017, co-PI, \$150,000.
39. Single molecule mRNA detection of prostate cancer biomarkers, Mayo Clinic, 2016-2017, co-PI, \$70,000.
40. Establishment of Illinois-JITRI Institute (IJI), JITRI, 2016-2017, \$200,000
41. Daily Quantification of Cancer-Associated Exosomal miRNA in Patient Blood by Photonic Crystal-Enhanced Quantum Dot Emission, NIH R01, 2018-2023, co-PI, \$1,840,000
42. Illinois-JITRI Institute (IJI), 4 projects in 2018 (other faculty) \$2,000,000
43. University of Illinois, 2019 Investment for Growth, Enhanced fabrication tools for the Micro and Nanotechnology Laboratory Cleanroom Facility, PI, \$4,000,000
44. Living tissue biosensor, Yang Award, PI, \$15,000
45. Smartphone-linked system for diagnosis and epidemiological reporting of pathogens at the point of care, NIH NIAID R01, 2019-2023, co-PI, \$1,700,000
46. Multiplexing Activate Capture + Digital Counting (AC+DC) assay technology, Mikashi Award, 2019-2020,

PI, \$125,000

47. Clip-on Smartphone biosensor for mobile health diagnostics, NSF Partnerships for Innovation, 2019-2021, PI, \$250,000.
48. Photonic resonator hybrids for ultrasensitive biosensing, NSF Biophotonics, 2019-2023, co-PI, \$600,000.
49. A rapid and ultrasensitive technology for sensing intact SARS-CoV-2 using designer DNA nanostructure capture probes and photonic resonator interference scattering microscopy, NSF RAPID, 2020, PI, \$165,000.
50. Exosome separation and digital resolution detection of blood-based nucleic acid biomarkers for noninvasive therapeutic diagnostics in cancer, NIH NCI/NIBIB, 2020-2024, PI, \$2,000,000.
51. A single-step 10-minute point of care COVID-19 diagnostic test using Activate Cleave & Count (ACC) technology, JUMP-ARCHES, 2020, PI, \$50,000.
52. Zhejiang University+Illinois Center for Pathogen Diagnostics, Grainger College of Engineering, Co-Director, 2020-2025, \$2,375,000.
53. Lateral flow assay for multiplexed detection of SARS-CoV-2 RNA and antigens in point-of-care settings, NSF, 2022-2025, Co-PI, \$480,000
54. Detection and automatic privacy-protected contact tracing system designed for COVID-19, NIH RadXRad and RadXTech, Co-PI, 2020-2023, \$950,000
55. Point of collection testing of viral pathogens, antibodies, and antigens, CSL Behring, Co-PI, 2021-2024, \$1,957,000
56. Engineering Quantum Dots and Photonic Metamaterials for Ultrasensitive and Multiplexed Digital Resolution Biomolecule Detection. NSF, Co-PI, 2023-2025, \$600,000
57. Ultrasensitive point of care detection of lung cancer ctDNA biomarkers using CRISPR-based Activate Cleave & Count (ACC) technology, Cancer Center at Illinois Philanthropic Grant, PI, 2022-2024, \$200,000
58. Molecular Dynamics Modeling of Target Recycling Amplification for Ultrasensitive Detection of RNA-based Cancer Biomarkers, Cancer Center at Illinois Seed Grant, Co-PI, 2022-2024, \$200,000
59. Application of Biosensor Technology and the Activate Capture and Digital Counting Assay for Minimally Invasive Detection of microRNA (miRNA) in Human Milk and Neonatal Plasma, UIUC Personalized Nutrition Initiative Seed Grant, Co-PI, 2023-2024, \$50,000
60. Non-invasive monitoring of gestational health via placental miRNA biomarkers using AC+DC technology, NIC, Co-PI, 2023-2025, \$424,000
61. Rapid, simple, and ultrasensitive quantification of KRAS ctDNA at the point of care using CRISPR/Cas amplification and digital resolution biosensor microscopy, NIH, Co-PI, 2023-2026, \$391,400

Other Significant Funding:

1. Draper Laboratory Engineering Lead Project: MicroCANARY, 1996, PI, \$250,000
2. MicroCANARY MEMS Chemical Analysis System, DARPA, ~1997-1999, PI (while at Draper Laboratory), approximately \$1,000,000
3. SRU Biosystems, Angel Investment and Institutional VC Funding, approximately \$30,000,000 (company was restructured to Xbody Biosciences in 2012, and subsequently sold to Juno Therapeutics for \$46M)
4. Exalt Diagnostics, Seed institutional investment, 2014, \$100,000