Fatima Toor, Ph.D.

Professor and Lowell G. Battershell Endowed Chair in Laser Engineering
Electrical and Computer Engineering

Curriculum Vitae as of October 2026

Campus Address: Electrical and Computer Engineering (ECE), 1406 Seamans Center, University of Iowa
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Research Website: https://ftoor.lab.uiowa.edu/

CAREER HIGHLIGHTS

- 42 published papers and 37 conference abstracts (peer-reviewed); 8 patents and patent applications
- Over $7.7 million in total research funding
- PI on grants awarded by NSF, DOE, and DOD and private companies, such as Collins Aerospace & Monteris Medical
- Research mentor of over 45 undergraduate researchers, two co-advised and one fully-advised postdoctoral researcher, seven Ph.D. students, and seven M.S. with thesis students (2018 Outstanding Research Mentor award)
- Appointed UI Faculty Senate Research Council Chair (2022-2024) and member (2022-2027)
- Co-Chair of a National Academies of Sciences, Engineering and Medicine (NASEM) workshop on Quantum Coherent Networks (2024)
- Senior Member of the National Academy of Inventors (2026); Senior Member IEEE, SPIE, and Optica
- Co-awarded Iowa Innovator of the Year Award (2022)
- Appointed Lowell G. Battershell Endowed Chair in Laser Engineering (2021)

RESEARCH INTERESTS

- Quantum optics and photonics
- Semiconductor optoelectronics
- Terahertz quantum cascade lasers
- Mid-infrared laser medicine
- Sensors: biomedical and environmental

EDUCATION AND PROFESSIONAL HISTORY

Post-Graduate Education

2010 - 2011 **Postdoctoral Researcher**, Silicon photovoltaics and photoelectrochemistry, National Renewable Energy Lab, Golden, Co
Mentor(s): Howard Branz; Todd Deutsch

2009 - 2010 **NSF MRSEC Postdoctoral Fellow**, Infrared metamaterials, Pennsylvania State University, State College, PA
Mentor(s): Theresa Mayer; Doug Werner

Higher Education

2009 **Ph.D.**, Electrical Engineering - Semiconductor Optoelectronics, Princeton University, Princeton, NJ
Thesis: Spectrally high performing quantum cascade lasers
(Advisor: Clair F. Gmachl)

2006 **MA**, Electrical Engineering, Princeton University, Princeton, NJ
Minors: Physics & Science Technology and Environmental Policy

2004 **BS**, Double Major in Physics and Engineering Science (Advisors: Susan E. Voss and

Malgorzata Pfabe), Smith College, Northampton, MA

Professional and Academic Positions

2025 – Present	**Professor,** Electrical and Computer Engineering (100%), Physics and Astronomy (0.025%), University of Iowa MATFab facility, Affiliate Member – Holden Comprehensive Cancer Center Experimental and Redox Therapeutics Program, University of Iowa, Iowa City IA (>$7.7 million in research funding as a PI or Co-PI since 2014)
2025 – Present	**Co-Founder and President**, MIRTHz Photonics, Inc., Coralville, IA
2021 – Present	Appointed **Lowell G. Battershell Endowed Chair in Laser Engineering**, Electrical and Computer Engineering Department, University of Iowa, Iowa City, IA
2021 – Present	**Vice President,** Juggernaut Life Sciences Inc., Coralville, IA
2022 – 2024	Appointed **Faculty Senate Research Council Chair,** Office of the Vice President for Research, University of Iowa, Iowa City, IA
2020 – 2025	**Associate Professor,** Electrical and Computer Engineering (100%), Physics and Astronomy (0.025%), Iowa Technology Institute, Iowa CREATES and MATFab facility, Associate Member – Holden Comprehensive Cancer Center Experimental Therapeutics Program, University of Iowa, Iowa City IA
2016 – 2023	**Co-founder, Vice President, and COO**, Firefly Photonics LLC, Coralville, IA
2015 – 2018	**Technology Advisor**, Advanced Silicon Group, Inc, Lincoln, MA
2014 – 2020	**Assistant Professor,** Electrical and Computer Engineering (100%), Physics and Astronomy (0.025%), University of Iowa, Iowa City IA
2011 – 2014	**Research Analyst**, Lux Research Inc., Boston, MA
2004 – 2009	**Graduate Research Assistant, Ph.D. Candidate (Advisor: Claire Gmachl)**, Princeton University, Princeton, NJ
2004	**Electrical Engineering Intern (Manager: Ron Nunes)**, IBM T. J. Watson Research Center, Yorktown Heights, NY
2003	**Electrical Engineering Intern (Manager: Ron Nunes)**, IBM T. J. Watson Research Center, Yorktown Heights, NY
2002 – 2003	**Undergraduate Research Assistant - Hearing Research Lab (Advisor: Susan Voss)**, Smith College, Northampton, MA
2001 – 2002	**Undergraduate Research Assistant - Wireless Communication Theory Group (Advisor: Dennis Goeckel)**, UMass-Amherst, Amherst, MA

Honors and Awards

2026	**National Academy of Inventors (NAI) Senior Membership,** nominated by the UI NAI chapter
2026	**2026 Best Undergraduate Poster Award,** 2026 College of Engineering Research Open House, Alec Melendez, Adam Nikulski, Fatima Toor, “Mid-Infrared Quantum Cascade Laser based Gas Sensor for Trace-Level N2O Detection”, University of Iowa, Iowa City, IA
2025	**American Association for the Advancement of Science (AAAS),** selected and supported by Provost’s office towards an AAAS Fellow nomination in three years.
2025	**2025 Best Undergraduate Poster Award,** 2025 MATFab Materials Frontier Symposium, Joel Dillman, Sage Marks, Fatima Toor, “3D printed optical cavity for a gas sensor system: Fabrication and Characterization”, University of Iowa, Iowa City, IA
2024	**Selected to co-organize the National Academies of Sciences, Engineering and Medicine’s workshop on Quantum Coherent Networks.** Nominated by the UI Provost’s office and selection process by the National Academies was at a national level.
2024	**2024 Best Graduate Poster Award**, 2024 College of Engineering Research Open House, Kaleb McClenathan, Zane Shellenbarger, and Fatima Toor, "Quantum Design Simulations for High-Performance Thermophotovoltaic Cells - An Iterated Local Search Algorithm Approach"
2024	**2024 Best Undergraduate Poster Award**, 2024 College of Engineering Research Open House, Robert Schwan III, Daniel Keefe, Sandeep Laroia, Fatima Toor, "Soft Tissue Ablation Via Mid-Infrared Lasers for Surgical Applications"
2023	**Induction to the Iowa Chapter of the National Academy of Inventors** and as of 2024, one

	of four Advisory Committee Members of the chapter
2023	**University of Iowa medallion** for extraordinary accomplishments in research and innovation
2023	**2023 Best Graduate Poster Award**, 2023 College of Engineering Research Open House, Daniel Keefe, David T. Christianson, Hiroyuki Oya, Chris Petkov, Matthew Howard, Fatima Toor, "Simulating Neuroablation with Intracranial Electrodes: Optical and Bioheat FEM Modeling of Neurosurgical Near-Infrared Laser Interstitial Thermal Therapy"
2023	**2023 Best Undergraduate Poster Award**, Xavier Uhrmacher, Sandeep Laroia, Fatima Toor, "Optical Fiber Integrated Surgical Balloons: Identifying Bend Loss Characteristics of Mid-Infrared Laser Coupled Fibers"
2022	**2022 Best Undergraduate Poster Award**, Ryan Edwall, Sandeep Laroia, Fatima Toor, "Automation of Paracentesis Robot Prototype Using a Joint Raspberry Pi-Arduino System Controlled by a Graphical User Interface (GUI)"
2022	**Innovator of the Year Award,** due to contributions to commercialization of optical technologies
2022 - Present	**Elected as the Senior Member**, SPIE, the professional society for optics and photonics
2019, 2020	**Community Champion**, SPIE, the society for optics and photonics technology (awarded to only 10% of the SPIE membership for their outstanding community service to the international optics and photonics professionals)
2019 - Present	**Elected as the Senior Member**, Optica (formerly The Optical Society of America (OSA))
2019 - 2023	**Elected as a Member and Co-Chair of the Electrical Engineering Group**, Natural Sciences and Engineering Research Council of Canada
2019	**Finalist for the Best Student Paper Award**, 46th IEEE Photovoltaics Specialists Conference, Amir Asgharzadeh, Marc Abou Anoma, Adam Hoffman, Chetan Chaudhari, Sushrut Bapat, Richard Perkins, Dan Cohen, Daniel Riley, Fatima Toor, Ben Bourne "A Benchmark and Validation of Bifacial PV Irradiance Models".
2019	**Selected Participant of the US Frontiers of Engineering Innovation Symposium**, National Academy of Engineering, Competitive selection of 100 early-career engineers from industry, universities, and government labs.
2019	**2019 Faculty Startup of the Year Award**, Office of the Vice President of Research
2018	**2018 Outstanding Research Mentor Award**, University of Iowa College of Engineering
2018	**Finalist for the Best Student Paper Award**, 2018 World Conference on Photovoltaic Energy Conversion (WCPEC-7), Amir Asgharzadeh, Chris Deline, Joshua Stein, Fatima Toor, "A Comparison Study of the Performance of South/North-facing vs East/West-facing Bifacial Modules under Diffuse Shading Conditions"
2018	**Finalist for the Best Student Poster Award**, 2018 World Conference on Photovoltaic Energy Conversion (WCPEC-7), Wenqi Duan, Bingtao Gao, K A S M Ehteshamul Haque, and Fatima Toor, "Performance optimization techniques for the front and back of nanostructured ‘black silicon’ solar cells"
2018	**2018 Best Graduate Poster Award**, 2018 College of Engineering Research Open House, Wenqi Duan, Bingtao Gao, Hui Zhi, Gregory LeFevre, Fatima Toor, "High Sensitivity Silicon Nanowire Biosensor for Estrogen Detection in Water Streams"
2018	**2018 Best Undergraduate Poster Award**, 2018 College of Engineering Research Open House, Joshua Deutsch, Aaron Silva, Fatima Toor, "Mie Scattering based Analytical Model to Compute Plasmon Resonances of Metal Nanoparticles"
2018	**2018 People's Choice Award (3rd out 111 posters)**, 2018 College of Engineering Research Open House, Amir Asgharzadeh Shishavan, Chris Deline, Joshua Stein, Fatima Toor, "Impact of Diffuse Shading Conditions on the Performance of Bifacial PV Modules"
2017	**2017 Research Innovation and Leadership Finalist**, Iowa Technology Association
2017	**2017 University of Iowa International Programs Stanley International Travel Award**, University of Iowa International Programs and Stanley-UI Foundation Support Organization
2016	**Rising Star Finalist - Iowa Women of Innovation Award**, Iowa Technology Association
2016	**40 Under Forty Honoree (based on outstanding research performance)**, Corridor Business Journal
2016	**Semi-finalist SPIE 2016 Photonics West Start-up Challenge**, SPIE
2015	**Rising Star Finalist - Iowa Women of Innovation Award**, Iowa Technology Association

2015	**Old Gold Summer Fellowship**, University of Iowa
2013	**"2012 Rookie of the Year" Award for Outstanding Science Driven Research**, Lux Research, Best performing newly hired research analysts are nominated and voted on by the entire company including international offices.
2010	**APS Energy Research Workshop Fellowship**, American Physical Society, Competitive application process to attend the APS Energy Research Workshop. The fellowship covers the travel and lodging costs to attend the workshop.
2009 - 2010	**Materials Research Fellowship worth $100,000/year for Postdoctoral Research**, National Science Foundation (NSF)
2009	**Advancement of Women in Academic Science and Engineering Careers (ADVANCE) Program Fellowship**, National Science Foundation (NSF), Competitive application process to attend the NSF ADVANCE workshop held at Northeastern University. The fellowship covers the travel and lodging costs to attend the workshop.
2009	**Deans Fund for Scholarly Travel**, Princeton University, Competitive travel fund for graduate students to travel to conferences.
2008	**Wu Fund Travel Grant**, Princeton University, Competitive travel fund for graduate students to travel to conferences.
2006	**Ocean Optics Inc. Educational Grant**, Ocean Optics, Competitive grant that Ocean Optics, an optical component hardware company, awards for equipment used in teaching labs. I applied for and won this award for the purchase of a spectrometer to teach the lab portion of a course.
2005	**Sigma Xi Grants-in-Aid of Research Award**, Sigma Xi Research Society, Competitive award by the Sigma Xi Research Society for graduate students to perform research. I applied for and won the award to purchase an optical component for my research project.
2004	**Adelaide W. Bull Paganelli Prize for Outstanding Work in Physics**, Smith College, Awarded to top physics undergraduate student at the time of graduation.
2000 - 2004	**Jean Picker Engineering Program Fellowship**, Smith College
2003	**Adeline D. Penberthy Award for Academic Excellence**, Smith College
2003	**APS/IBM Women in Physics Undergraduate Research Program Award**, IBM, Competitive award given to top three female undergraduate summer research interns at IBM.
2003	**Induction to Tau Beta Kappa, Smith's name for the probationary chapter of the National Engineering Honor Society, Tau Beta Pi (TBP)**, Tau Beta Pi National Engineering Honor Society
2003	**Jean Picker Engineering Research Grant**, Smith College
2002 - 2003	**Lewis Leadership Program Fellowship**, Smith College
2001 - 2003	**First Group Scholar (Top 5% of class)**, Smith College
2000 - 2003	**Deans List**, Smith College

Professional Memberships

2007 – Present	Optical Society of America **(Senior Member)**
2017 – Present	SPIE the international society for optics and photonics **(Senior Member)**
2007 – Present	Institute of Electrical and Electronics Engineers (sub-group: Photonics Society) **(Senior Member)**
2025 – Present	American Association for the Advancement of Science (Member)
2017 – Present	American Society of Laser Medicine and Surgery

TEACHING

Spring 2015 – Spring 2025
(FMLA leave during Spring 2019 and Spring 2024)

Light blue shaded rows indicate a new course that I developed on quantum computing.
Grey shaded rows indicate senior design capstone course series that I co-instructed for two semesters.

Term	Course ID	Course Name	# Enrolled

Spring 2025	ECE:5700:0001	Advanced Electromagnetic Theory	5
Spring 2025	ECE:3720:0001	Semiconductor Devices	29
Fall 2024	ENGR:2120:0AAA	Engr Fund II: Electrical Circuits	97
Fall 2024	ECE:3700:0001	Electromagnetic Theory	38
Fall 2023	ECE:5995:0002	Contemp Topics in Elect & Computer Eng: Quantum Engineering: Computing and Devices	15
Spring 2023	ECE:5700:0001	Advanced Electromagnetic Theory	17
Spring 2023	ECE:3720:0001	Semiconductor Devices	19
Fall 2022	ECE:3700:0001	Electromagnetic Theory	20
Spring 2022	ECE:3720:0001	Semiconductor Devices	26
Fall 2021	ECE:5995:0002	Contemp Topics in Elect & Computer Eng: Quantum Engineering: Computing and Devices	10
Spring 2021	ECE:4880:0AAA	Prin of Electrical and Compr Eng Design	26
Spring 2021	ECE:4890:0AAA	Sr Elec and Computer Engineering Design	54
Spring 2021	ECE:3720:0001	Semiconductor Devices	23
Fall 2020	ECE:4880:0AAA	Prin of Electrical and Compr Eng Design	54
Fall 2020	ECE:4890:0AAA	Sr Elec and Computer Engineering Design	19
Fall 2020	ECE:5000:0001	Graduate Seminar Elect & Computer Eng	40
Spring 2020	ENGR:2120:0AAA	Engr Fund II: Electrical Circuits	101
Fall 2019	ECE:3700:0001	Electromagnetic Theory	45
Fall 2018	ENGR:2120:0DDD	Engr Fund II: Electrical Circuits	90
Spring 2018	ECE:5700:0001	Advanced Electromagnetic Theory	10
Fall 2017	ENGR:2120:0DDD	Engr Fund II: Electrical Circuits	87
Fall 2017	ECE:3700:0001	Electromagnetic Theory	59
Spring 2017	ECE:3720:0001	Semiconductor Devices	30
Fall 2016	ECE:3700:0001	Electromagnetic Theory	62
Spring 2016	ECE:3720:0001	Semiconductor Devices	25
Fall 2015	ECE:3700:0001	Electromagnetic Theory	80
Spring 2015	ECE:3720:0001	Semiconductor Devices	23
Spring 2015	ECE:5700:0001	Advanced Electromagnetic Theory	5

Research Mentoring

Postdoctoral Research Supervision

2026 - Present Vaghefi, Maryam, primary advisor

2018 - 2021 Dai, Weitao, Co-advised with Professor John Prineas.

2017 - 2018 Kim, Baek Hyun, Co-advised with Professor John Prineas.

PhD - Dissertation Committee Chair

June 2026 – Present	McLauglin, Molly; Electrical and Computer Engineering, *In Progress*
Aug 2024 – Present	Li, Zhengyang; Electrical and Computer Engineering, *In Progress*
Jan 2024 – Present	Ramker, Adam; Electrical and Computer Engineering, *In Progress*
Aug 2020 – Aug 2024	Keefe, Daniel; Electrical and Computer Engineering, *Completed (First position after Ph.D. completion: Biomedical Device Engineer, Juggernaut Life Sciences, Inc.) Best Graduate Research Poster Award, 2023 College of Engineering Research Open House; 2023 UI OVPR's Dare to Discover Featured Graduate Researcher*
Aug 2017 - Aug 2021	Gao, Bingtao, Electrical and Computer Engineering, *Completed (First position after Ph.D. completion: Postdoctoral Researcher in Deren Yang's group at Zhejian University)*
Aug 2015 - Sept 2020	Duan, Wenqi; Electrical and Computer Engineering, *Completed (First position after Ph.D. completion: New Product Information (NPI) Scientific Writer at Thorlabs Inc.)*
Aug 2015 - June 2019	Asgharzadeh Shishavan, Amir; Electrical and Computer Engineering, *Completed (First position after Ph.D. completion: PV Systems Engineer, NextTracker, Fremont, CA, USA)*

MS - Master's Thesis Committee Chair

Aug 2024 – Present	Park, Chris; Electrical and Computer Engineering, *In Progress*
Jan 2024 – May 2026	Berry, Stephon; Electrical and Computer Engineering, *(First position after M.S. completion: Collins Aerospace)*
Jan 2024 – Dec 25	Hagen, Evan; Electrical and Computer Engineering, *(First position after M.S. completion: IBM Research at Albany, NY)*
Aug 2018 – Sept 2020	Eng, Tori; Electrical and Computer Engineering, *Completed (First position after M.S. completion: Technical Marketer at Thorlabs Inc.)*
Aug 2017 - May 2019	Walhof, Alex; Electrical and Computer Engineering, *Completed (First position after M.S. completion: Full-time Electrical Engineer at Firefly Photonics LLC)*
Aug 2016 - May 2018	Venable, Abby; Electrical and Computer Engineering, *Completed (SMART Graduate Fellowship Recipient, First position after M.S. completion: Electrical Engineer at Missile Defense Agency (Navy))*
Aug 2016 - May 2017	Davidson, Lauren; Electrical and Computer Engineering, *Completed (First position after M.S. completion: Systems Engineer at John Deere)*

PhD - Dissertation Committee Member

2018 – 2023	Le, Nam; Electrical and Computer Engineering, *Completed*
2018 – 2023	Malkawi, Walla; Pharmaceutical Sciences, *Completed*
2017 – 2023	Schrock, Katrina; Physics and Astronomy, *Completed*
2017 - 2022	Montealegre, David; Physics and Astronomy, *Completed*
2014 - 2021	Askari, Maziyar; Electrical and Computer Engineering, *Completed*
2013 - 2021	Bogh, Cassandra; Physics and Astronomy, *Completed*
2014 - 2021	Quang, Tri; Electrical and Computer Engineering, *Completed*
2014 - 2021	Smith, Rasheid; Pharmaceutical Sciences, *Completed*

2012 - 2020	Wang, Qinghua; Mechanical Engineering, *Completed*
2014 - Aug	Li, Xinxin; Physics and Astronomy, *Completed*
2012 - 2020	Zhang, Kailing; Physics and Astronomy, *Completed*
2013 - 2019	Muhowski, Aaron; Physics and Astronomy, *Completed*
2012 - 2017	Ricker, Russell; Physics and Astronomy, *Completed*
2010 - 2016	Provence, Sydney; Physics and Astronomy, *Completed*
2010 - 2016	Sahin Tiras, Kevser; Physics and Astronomy, *Completed*
2008 - 2015	Sahin, Cuneyt; Physics and Astronomy, *Completed*
2010 - 2015	Llamas, Ruben; Electrical and Computer Engineering, *Completed*

Undergraduate Research Supervision

Oct 2026 – Present	Livio, Angel I; Electrical and Computer Engineering
Oct 2026 – Present	Zheng, Joyce; Electrical and Computer Engineering
May 2026 – Present	Smith, Trevor; Electrical and Computer Engineering
Jan 2026 – Present	Bernard, Anson; Electrical and Computer Engineering
June 2025 – Present	Nikulski, Adam; Electrical and Computer Engineering
June 2025 – Present	Melendez, Alec; Electrical and Computer Engineering *(Best Undergraduate Research Poster Award, 2026 College of Engineering Research Open House); 2025 Summer OUR Fellow; 2026 NSF REU researcher at Penn State; 2026-27 Academic Year OUR Fellow*
June 2026 – Aug 2026	Regla, Alfredo; SROP Fellow, Cal State University, Electrical and Computer Engineering
May 2026 – Aug 2026	Kotchick, Peter; Electrical and Computer Engineering, *2026 Summer OUR Fellow*
May 2026 – Jul 2026	Monestina, Maria; Iowa State University, Chemical and Biochemical Engineering
May 2025 – May 2026	McLaughlin, Molly; Electrical and Computer Engineering, Undergraduate Honors Thesis, *Completed*
May 2025 – Dec 2025	Eyrich, Jack; Electrical and Computer Engineering, *Completed*
Jan 2025 – May 2025	Marks, Sage; Electrical and Computer Engineering, *Completed*
Aug 2024 – May 2025	Dillman, Joel; Electrical and Computer Engineering, *Completed (Best Undergraduate Research Poster Award, 2025 College of Engineering Research Open House)*
Aug 2023 – May 2026	Spahn, Christopher; Electrical and Computer Engineering, *Completed*
Jan 2023 – May 2023	Schwan III, Robert; Electrical and Computer Engineering, *Completed (Best Undergraduate Research Poster Award, 2024 College of Engineering Research Open House)*
Aug 2023 – Aug 2024	Gomez, Moises; Electrical and Computer Engineering, *Completed*
Jan 2023 – Dec 2023	Uhrmacher, Xavier; Electrical and Computer Engineering, *Completed (Best Undergraduate Research Poster Award, 2023 College of Engineering Research Open House)*
Jan 2023 – May 2023	McClenathan, Kaleb; Electrical and Computer Engineering, *Completed*

Jan 2023 – May 2023	Nelson, Tyler; Electrical and Computer Engineering, *Completed*
June 2022 – Dec 2022	Saeed, Alaeldin; Electrical and Computer Engineering, *Completed*
May 2021 – Dec 2022	Edwall, Ryan; Electrical and Computer Engineering, *Completed (Best Undergraduate Research Poster Award, 2022 College of Engineering Research Open House; Outstanding Student Researcher Award, 2022 College of Engineering Student Excellence Awards)*
Sept 2020 – May 2022	Sindt, Jacob; Electrical and Computer Engineering, *Completed (ICRU Fellow Summer 2021)*
June 2019 – Dec 2021	Phetmanysay, Daniel, Mechanical Engineering, *Completed*
Dec 2018 - May 2020	Larson, Eric; Electrical and Computer Engineering, *Completed (ICRU Fellow Summer 2019, PhD student in BME at UI)*
May 2018 - Aug 2018	Dvorak, Nate; Physics and Mathematics, Coe College, *Completed (NSF GRFP Winner, grad student at UMich)*
May 2018 - Aug 2018	Rost, Oliver; BBA student, *Completed (JPEC fellow Summer 2018)*
May 2018 - Aug 2018	Haider, Olivia; Montana State University Chem Eng *(NSF REU, Summer 2018)*
Jan 2018 - Aug 2018	Dietz, Clarissa; Physics and Astronomy, *Completed (ICRU Fellow Summer 2018) (grad student at UW-Madison)*
Jan 2018 - Sept 2018	Liyanage, Suram; Electrical and Computer Engineering, *Completed (ICRU Fellow Summer 2018)*
Jan 2018 - May 2018	Deutsch, Joshua; Electrical and Computer Engineering, *Completed*
Jan 2018 - May 2018	Lopez, Seth; Electrical and Computer Engineering, *Completed*
May 2017 - May 2018	Silva, Aaron; Biomedical Engineering, *Completed (NSF GRFP Winner, grad student at GA Tech)*
Sept 2017 - Dec 2017	Erickson, Constance; Electrical and Computer Engineering, *Completed*
Sept 2017 - Dec 2017	Kelly, Daniel; Electrical and Computer Engineering, *Completed*
Jan 2017 - May 2017	Bell, Cooper; Electrical and Computer Engineering, *Completed*
Jan 2017 - May 2017	Machlab, Daniel; Electrical and Computer Engineering, *Completed*
Sept 2016 - Dec 2016	Lubenow, Thomas; Electrical and Computer Engineering, *Completed (Software Engineer at Tesla)*
Sept 2016 - Aug 2017	Nichols, Logan; Electrical and Computer Engineering, *Completed (ICRU Fellow Summer 2017) (Full-time Engineer at Firefly Photonics LLC)*
Sept 2016 - Dec 2016	Sherwani, Suman; Electrical and Computer Engineering, *Completed*
June 2016 - Dec 2016	Wu, David; Electrical and Computer Engineering, *Completed*
Jan 2016 - Aug 2016	Thommana, Matthew; Electrical and Computer Engineering, *Completed (ICRU Fellow Summer, grad student at GA Tech)*
Sept 2015 - Aug 2016	Larson, Joshua; Electrical and Computer Engineering, *Completed (ICRU Fellow Summer 2016) (Grad student at UCLA)*
Sept 2015 - Aug 2016	Wassweiler, Ella; Electrical and Computer Engineering, *Completed (Grad student at MIT, PV Engineer at First Solar)*
June 2015 - May 2016	Nordin, Leland; Electrical and Computer Engineering, *Completed (Grad student in D. Wasserman's lab at UT-Austin, Postdoc at Stanford)*
Jan 2015 - May 2015	Gansemer, Eric; Electrical and Computer Engineering, *Completed*

Jan 2015 - May 2016 Ryan, Jason; Electrical and Computer Engineering, *Completed*

K-12 Research Supervision

SCHOLARSHIP

Publications

Refereed Journal Articles

1. Daniel W. Keefe, Sandeep Laroia, and **Fatima Toor**, "Mid-infrared multimode fluoride fiber bend loss studies and FEM modeling—toward surgical applications," Appl. Opt. 64, 9984-9994 (2025).

2. Daniel W. Keefe, David T. Christianson, Greyson W. Davis, Hiroyuki Oya, Matthew A. Howard, Christopher I. Petkov, Fatima Toor, Modeling for neurosurgical laser interstitial thermal therapy with and without intracranial recording electrodes, Current Research in Neurobiology, 2024. 7: p. 100139. ISSN 2665-945X, https://doi.org/10.1016/j.crneur.2024.100139.

3. Manish Mosalpuri, Fatima Toor, Mark Mba-Wright, Techno-economic analysis of a solar thermophotovoltaic system for a residential building, J. Photon. Energy 14(4), 042404 (2024), doi: 10.1117/1.JPE.14.042404.

4. S. Maryam Vaghefi Esfidani, Daniel W. Keefe, **Fatima Toor**, Thomas G. Folland; Non-destructive characterization of silicon nanowires and nanowire coatings using mid-infrared spectroscopy. Appl. Phys. Lett. 6 May 2024; 124 (19): 191603.

5. Annick Anctil, Meghan N. Beattie, Christopher Case, Aditya Chaudhary, Benjamin D. Chrysler, Michael G. Debije, Stephanie Essig, David K. Ferry, Vivian E. Ferry, Marina Freitag, Isaac Gould, Karin Hinzer, Harald Hoppe, Olle Inganäs, Lethy Krishnan Jagadamma, Min Hun Jee, Raymond K. Kostuk, Daniel Kirk, Stephan Kube, Minyoung Lim, Joseph M. Luther, Lorelle Mansfield, Michael D. McGehee, Duong Nguyen Minh, Preeti Nain, Matthew O. Reese, Angèle Reinders, Ifor D. W. Samuel*, Wilfried van Sark, Hele Savin, Ian R. Sellers, Sean E. Shaheen*, Zheng Tang, **Fatima Toor***, Ville Vähänissi, Ella Wassweiler, Emily L. Warren, Vincent R. Whiteside, Han Young Woo, Gang Xiong, Xitong Zhu, "Status Report on Emerging Photovoltaics," J. Photon. Energy 13(4), 042301 (2023), doi: 10.1117/1.JPE.13.042301. *Co-editors of the status report.

6. Walla Malkawi, Areeb Lutfi, Maaz Khan Afghan, Lamisha Mashiyat Shah, Lillian Costandy, Arturo B. Ramirez, Thaddeus C. George, **Fatima Toor**, Aliasger K. Salem, and Pashtoon Murtaza Kasi, "Circulating tumour cell enumeration, biomarker analyses, and kinetics in patients with colorectal cancer and other GI malignancies", Frontiers in Oncology 13, 1305181, 2023, https://www.frontiersin.org/articles/10.3389/fonc.2023.1305181. ISSN 2234-943X.

7. Nam H. Le, Milan Sonka, **Fatima Toor**, "A Quantum Optimization Method for Geometric Constrained Image Segmentation", 2310.20154, 2023. https://arxiv.org/abs/2310.20154

8. Wenqi Duan*, Hui Zhi*, Daniel Keefe, Bingtao Gao, Gregory LeFevre, Fatima Toor, "Sensitive and Specific Detection of Estrogens Featuring Doped Silicon Nanowire Arrays", ACS Omega 2022, https://doi.org/10.1021/acsomega.1c00210. *equal contribution first authors

9. Bingtao Gao, Anthony A. Rojas Chavez, Walla I. Malkawi, Daniel W. Keefe, Rasheid Smith, Hillel Haim, Aliasger K. Salem, **Fatima Toor**, "Sensitive detection of SARS-CoV-2 spike protein using vertically-oriented silicon nanowire array-based biosensor", Sensing and Bio-Sensing Research, Volume 36, 2022, 100487, ISSN 2214-1804.

10. Bingtao Gao, Alexander C. Walhof, David A. Laird, **Fatima Toor**, and John P. Prineas,"Analytical Evaluation of Mobile In Situ Soil Nitrate Infrared Sensor Designs for Precision Agriculture" IEEE Sensors Journal, vol. 21, no. 18, pp. 20200-20209, 2021.

11. Eric Larson, Madeline Hines, Munir Tanas, Benjamin Miller, Mitchell Coleman, Fatima Toor, "Mid-infrared absorption by soft tissue sarcoma and cell ablation utilizing a mid-infrared interband cascade laser," J. Biomed. Opt. 26(4), 043012 (2021) as part of the Special Issue on Advances in Terahertz Biomedical Science and Applications.

12. Rytlewski, Jeffrey D.; Scalora, Nicholas; Garcia, Keith; Tanas, Munir; **Toor, Fatima**; Miller, Benjamin; Allen, Bryan; Milhem, Mohammed; Monga, Varun. "Photodynamic Therapy Using Hippo Pathway Inhibitor Verteporfin: A Potential Dual Mechanistic Approach in Treatment of Soft Tissue Sarcomas" Cancers 13, no. 4: 675 (2021) as part of the Special Issue on New Directions for Treating Soft Tissue Sarcomas.

13. Xinxin Li, Alexander C. Walhof, Weitao Dai, Ilke Arslan, Yuzi Liu, **Fatima Toor**, and John P. Prineas, "Enhanced radiative and thermal properties from surface encapsulation of InAs nanowires," Opt. Mater. Express 11, 719-728 (2021).

14. Kailing Zhang, Xinxin Li, Alexandar Walhof, Yuzi Liu, **Fatima Toor**, John P. Prineas, "Long Interior Carrier Lifetime in Selective-Area InAs Nanowires on Silicon", OSA Optical Materials Express Vol. 10, Issue 10, pp. 2470-2479 (2020).

15. Avik Samanta, Qinghua Wang, Gurjap Singh, Scott Shaw, **Fatima Toor**, Albert Ratner and Hongtao Ding, "Nanosecond Pulsed Laser Processing Turns Engineering Metals Antireflective and Superwetting", Journal of Manufacturing Processes, Volume 54, Pages 28-37 (2020).

16. Qinghua Wang , Haoxuan You , Zach Lowery , Songwei Li , Hao Fu , Ruoxing Wang , Caterina Lamuta , **Fatima Toor** , Wenzhuo Wu , Albert Ratner , Hongtao Ding, "An Innovative Laser Metasurface Fabrication Technique for Highly Flexible Optoelectronic Devices", J. Micro Nano-Manuf. 19, 1041, 2020.

17. Arthur Onno, Nathan Rodkey, Amir Asgharzadeh, Salman Manzoor, Zhengshan J. Yu, **Fatima Toor**, and Zachary C. Holman, "Predicted power output of silicon-based bifacial tandem photovoltaic systems", Joule, Volume 4, Issue 3, Pages 580-596 (2020).

18. Bingtao Gao, Wenqi Duan, Aaron D. Silva, Alexander C. Walhof, Weitao Dai, and **Fatima Toor**, "Light Management on Silicon utilizing Localized Surface Plasmon Resonance of Electroless Plated Silver Nanoparticles", OSA Optical Materials Express Vol. 9, Issue 9, pp. 3753-3764 (2019).

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2. **Fatima Toor**, "Biosensor could personalize cancer care", Bio Opinion, Biophotonics Magazine, January 2020.
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Technical Reports

1. Marion, B., MacAlpine, S., Deline, C., Asgharzadeh, A., Toor, F., Riley, D., Stein, J., Hansen, C. (2017). *A Practical Irradiance Model for Bifacial PV Modules: Preprint*. National Renewable Energy Laboratory (NREL), Golden, CO (United States).
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Patents: Issued and applications

1. Hyeongmin Seo, Florence Williams, and **Fatima Toor**, “Nanofabricated Vapor Sensor Array for Rapid Testing in Synthetic Biology”, PCT/US2026/038220.
2. **Fatima Toor**, "Compact laser scalpel and method for preferential ablation of tumor tissue", U.S. Patent # 12,076,080 (Issued: September 3, 2024).
3. Sandeep Laroia, **Fatima Toor**, and Daniel W. Keefe, "Multimodal therapy delivery system", Application No.: 63/669,850, Filing Date: July 11, 2024.
4. **Fatima Toor**, "Gallium-free vertical cavity surface emitting lasers (VCSELs)", Application No.: 63/637,622, Filing Date: April 23, 2024.
5. **Fatima Toor**, Ananda Carl Guneratne, Xin Jin, "Frequency selective surface for high performance solar coatings for reduced energy consumption in buildings", WO2017139280A1, Filed : February 7, 2017, Publication date: August 17, 2017.
6. Kimberly Ann Morio, David Ray Drake, John Arlin Goree, **Fatima Toor**, Kim Alan Brogden, Neil Quellhorst, "Light based dental treatment device", WO2018009864A1, Filed: July 7, 2017, Publication date: January 11, 2018.
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8. **Fatima Toor** and Howard M. Branz, “Copper-assisted, antireflection etching of silicon surfaces”, U.S. Patent # 8,815,104 (Issued: August 26, 2014).

Grants and Contracts

Funded (Total: $7,706,662 since 2014)

Jul 2026 – Nov 2026 *Metamaterial-Based RF Delay Lines: A Feasibility Study for Tens of Nanoseconds Delay at 361 MHz*
($46,466).
Funded by Collins Aerospace Investigator/s: Fatima Toor (PI at UI). Michael C Meholensky (Co-PI, Collins Aerospace, Applied & Research Technology)

Aug 2026 – Jul 2029 *Collaborative Research: Revealing the potential of bismides as efficient midwave infrared optical materials*
($583,391).
Funded by NSF Electronic Photonic Materials (EPM): Investigator/s: Fatima Toor (PI at UI). Zane Shallenbarger (Co-PI, SRI International)

Aug 2025 – May 2027 *Midwave Infrared Vertical Cavity Surface Emitting Lasers*
($116,432).
Funded by AFRL: Investigator/s: Fatima Toor (PI at UI). Ricky Gibson (PI at AFRL)

Jan 2026 – Dec 2028 *Terahertz Quantum Cascade Laser Development for High Precision Doppler Interferometric Velocimetry*
($300,000).
Funded by DOE LLNL Academic Collaboration Team: Investigator/s: Fatima Toor (PI at UI). Natalie Kostinski and Brian Poole (Co-PIs at LLNL)

Sept 2025 – Aug 2028 *High Performance 1.2 Terahertz Quantum Cascade Laser Development*
($267,000).
Funded by DOE LLNL Contract: Investigator/s: Fatima Toor (PI)

Apr 2025 – Mar 2026 *Accelerating synthetic biology for sustainable 1,5-diaminopentane production through nanofabricated high-throughput assay*
($78,298).
Funded by NSF Chemurgy 2.0 Seed Fund. Investigator/s: Hyeongmin Seo (PI), Fatima Toor (Co-PI), Florence Williams (Co-PI)

Jul 2025 – Jun 2028 *Graduate Leaders in Engineering and Advanced Manufacturing Fellowship Program*
($1,272,000).
Funded by NSF EGFP Program. Investigator/s: Yong Chen (PI), Suresh Raghavan (Co-PI), Xuan Song (Co-PI), and Fatima Toor (Co-PI)

Sept 2024 – Aug 2025 *High Power Near One Terahertz Quantum Cascade Lasers* ($150,000).
Funded by DOE LLNL LDRD Feasibility Study

Sept 2024 – Aug 2028 *Sub-Terahertz to Terahertz Metamaterial Coatings for Blackbody Radiation Shielding of Quantum Circuitry*
($999,984).
Funded by DOE EPSCOR. Investigator/s: Fatima Toor (PI)

Sept 2024 – Aug 2028 *RII Track-2 FEC: Data-Advanced Research and Education (DARE) to improve weather intelligence, localized climate change assessment and resilience capability in ag-based communities*
($375,000 of total funding of $5,999,727)
Funded by NSF EPSCOR. Investigator/s: Jun Wang (PI), Fatima Toor (Co-I) & others

Sept 2024 – Aug 2026 *UI P3: Growing Iowa into a Leader in Airborne and Ground-based Earth Science Measurement Capability*
($32,500 of a total funding of $3,000,000)
Funded by UI P3. Investigator/s: Matthew McGill (PI), Fatima Toor (Co-I) & others

Sept 2023 – Aug 2024 *High Power 0.1-1.5 Terahertz Quantum Cascade Laser Development for High Precision Doppler Interferometric Velocimetry*
($400,249)
Funded by Lawrence Livermore National Lab. Investigator/s: Fatima Toor (PI)

Oct 2023 – Jun 2024 *Silicon nanowire biosensor platform*
($40,000)
Funded by UI Ventures. Investigator/s: Fatima Toor (PI), Aliasger Salem (Co-PI)

Sept 2023 – Dec 2024 *Infrared sensing at the quantum limit for environmental and process monitoring*
($235,000)
Funded by the OVPR Interdisciplinary Scholars Grant. Investigator/s: Thomas Folland (PI Investigator), Ravi Uppu (Co-PI), Scott Shaw (Co-PI), Fatima Toor (Co-PI), Ed Gillan (Co-PI)

Feb 2023 – Jul 2024 *Interactive Impacts of Farmers' Mental Health Wellbeing and Climate Variability*
($200,000)
Funded by the OVPR Interdisciplinary Scholars Grant. Investigator/s: Marc Linderman (PI Investigator), Shaoping Xiao (Co-PI), Fatima Toor (Co-PI)

Dec 2022 – Jun 2023 *Precision optical modulation of neuronal circuits in the human brain* ($10,000)
Funded by the BRAIN Initiative Accelerator Grant. Investigator/s: David Christianson, Fatima Toor, Douglas Fredericks, Joel Berger, Hiroyuki Oya, Jeremy Greenlee, Matthew Howard & Christopher Petkov

Dec 2022 – Dec 2023 *Silicon Nanowire Biosensor Platform for Liquid Biopsy Guided Colorectal Cancer*

Therapy ($10,000)
Funded by the Oberley Seed Grant Program. Investigator/s: Fatima Toor (PI Investigator), Aliasger Salem (Co-PI), Saima Sharif (Co-PI).

Nov 2022 – Oct 2023 *Vajra technology: a novel way to harness mid-infrared laser energy for image-guided surgical procedures* ($28,000)

May 2022 – Apr 2023 *Encoding and manipulating medical images using quantum computers* ($25,000)
Funded by the P3 QSim Initiative. Investigator/s: Gary Christensen (PI Investigator), Joseph Reinhardt (Co-PI), Fatima Toor (Co-PI).

Apr 2022 – May 2023 *Tulip technology: a novel way to harness mid-infrared laser energy for image-guided surgical procedures* ($60,000)
Funded by the UI Ventures. Investigator/s: Sandeep Laroia (PI Investigator), Fatima Toor (Co-PI).

Mar 2022 – Apr 2023 *Evaluation of Thermophotovoltaic Systems as a Clean Energy Generation and Storage Technology: Prototype Build and Techno-Economic Assessment* ($17,500)
Funded by the P3 Decarb Initiative. Investigator/s Fatima Toor (PI Investigator), Mark Mba-Wright (Co-PI).

Dec 2021 – Dec 2022 *Compact Mid-Infrared Laser Based Surgical Margin Resection System* ($50,000)
Funded by the UI Ventures. Investigator/s Fatima Toor (PI Investigator)

March 2021 *AI/ML supported analysis of multiple volatile organic compounds (VOCs) detection data with high spectral overlap*
Funded by Iowa Initiative for Artificial Intelligence (Staff support time). Investigator/s Fatima Toor (PI Investigator), Peter Thorne (Co-PI).

Jan 2019 - Dec 2020 *Photonic Crystal Infrared Emitters (PhIRE Phase 2)*
Funded by US Airforce. Award amount: ($154,199.00) Percent effort: 50. Investigator/s Fatima Toor (Co-PI), John Prineas (Co-PI).

Jul 2019 - Jun 2020 *Dynamically Tunable Metamaterial for Terahertz Spectroscopy*
Funded by CCAD ($50,000). Percent effort: 50. Investigator/s Hongtao Ding (PI Investigator), Fatima Toor (Co-PI).

Apr 2018 - Dec 2019 *Efficient Arrays for Generating Light Emission (EAGLE) Phase II*
Funded by US Department of Defense, Air Force. Award amount: ($225,000.00). Investigator/s John Prineas (PI Investigator), Fatima Toor (Co-PI).

Aug 2019 - Oct 2019 *Optical Nitrate Sensor*
Funded by NSense. Percent effort: 50.

Aug 2016 - Jul 2019 *OP: Towards high performance III-V nanowire photonic devices: Novel testing techniques and device structures*
Funded by National Science Foundation. Award amount: ($374,920.00). Investigator/s Fatima Toor (PI Investigator), John Prineas (Co-PI), Thomas Boggess (Co-PI).

Oct 2015 - Dec 2018 *Performance Models for Bifacial PV Module Technologies*
Funded by US Department of Energy. Award amount: ($240,000.00). Investigator/s Fatima Toor (Co-PI), Josh S Stein (PI Investigator), Chris Deline (Co-PI).

Superlattice Light Emitting Diode Array - Multi-Spectral (SAMS)
Funded by US Army. Award amount: ($150,000.00). Percent effort: 10. Investigator/s John Prineas (PI Investigator), Fatima Toor (Co-Investigator).

Jun 2018 *Two-Dimensional Surface Emitting Mid-Wave Infrared (MWIR) Interband Cascade Laser Arrays for High-Power Applications*
Funded by Navy SBIR Phase I. Award amount: ($100,000.00). Investigator/s Edwin Koerperick (PI Investigator), Fatima Toor (Co-PI), John Lawler (Co-PI).

Development and Testing of a Novel Sensor Platform Technology for Detection of Endocrine Disrupting Compounds
Funded by Environmental Health Sciences Research Center. Award amount: ($40,000.00). Investigator/s Gregory LeFevre (PI Investigator), Fatima Toor (Co-

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Mar 2017 - Feb 2018 *Endocrine Disrupting Compounds in Water Sources: Development of a Functionalized Silicon Nanowire Biosensor for Detection and Quantification in Complex Mixtures*
Funded by Center for Health Effects of Environmental Contamination. Award amount: ($40,000.00). Investigator/s Fatima Toor (Co-PI), Gregory LeFevre (Co-PI).

Jul 2016 - Jan 2018 *Customer discovery for silicon nanowire biosensor*
Funded by National Science Foundation Innovation Corps. Award amount: ($50,000.00). Investigator/s Fatima Toor (PI Investigator), Marcie Black, Logan Nichols.

Feb 2017 - Dec 2017 *Development of Mid-infrared Quantum Cascade Laser based System for Preferential Tissue Ablation of Residual Soft Tissue Sarcoma*
Funded by UIHC Sarcoma Multidisciplinary Oncology Group. Award amount: ($14,092.00). Investigator/s Fatima Toor (PI Investigator).

Dec 2016 - Nov 2017 *A novel optoelectronic cartridge for cancer biomarker detection utilizing silicon nanowire arrays*
Funded by NSF STTR. Award amount: ($225,000.00). Investigator/s Fatima Toor (Co-PI), Marcie Black (PI Investigator), Aliasger Salem (Co-PI).

Jun 2016 - May 2017 *Efficient Arrays for Generating Light Emission (EAGLE)*
Funded by US Department of Defense, Air Force. Award amount: ($75,000.00). Investigator/s John Prineas (Co-PI), Fatima Toor (Co-PI), Thomas Boggess (Co-PI).

May 2016 - Apr 2017 *Development of a Human White Fat Biomimetic*
Funded by Office of Vice President of Research and Economic Development (OVPRED). Award amount: ($60,000.00). Investigator/s Fatima Toor (Co-PI), Aloysius Klingelhutz (PI Investigator), Aliasger Salem (Co-PI), James Ankrum (Co-PI), Matt Potthoff.

Jul 2016 - Apr 2017 *Quantum Efficiency Measurement and Analysis of Tandem Junction Solar Cells*
Funded by Iowa Energy Center. Award amount: ($99,877.00). Investigator/s Fatima Toor (PI Investigator).

Apr 2016 - Mar 2017 *Multilayer solar cells using black silicon and hybrid perovskites*
Funded by Office of Vice President of Research and Economic Development (OVPRED). Award amount: ($44,341.00). Investigator/s Michael Flatte' (PI Investigator), Fatima Toor (Co-PI), Markus Wohlgennant (Co-PI).

Jan 2016 - Dec 2016 *A Silicon Nanowire Array Optoelectronic Cartridge for Cancer Biomarker Detection*
Funded by University of Iowa Ventures. Award amount: ($65,000.00). Investigator/s Fatima Toor (PI Investigator), Aliasger Salem.

Dec 2015 - Nov 2016 *HRTEM Analysis of Molecular Beam Epitaxy (MBE) Grown Group III-V NWs*
Funded by Office of Vice President of Research and Economic Development (OVPRED) and Central Microscopy Research Facility (CMRF). Award amount: ($1,000.00). Investigator/s Fatima Toor (PI Investigator), John Prineas (PI Investigator).

Aug 2015 - Jul 2016 *Photonics STEM Camp for 4th-6th Grade Girls*
Funded by IEEE Photonics Society. Award amount: ($500.00). Investigator/s Fatima Toor (PI Investigator).

Jan 2016 - Jun 2016 *Growth of InAs/GaSb on patterned and foreign substrates for greatly improved external quantum efficiency*
Funded by AFOSR. Investigator/s Fatima Toor (Co-PI), John Prineas (PI Investigator), Tom Boggess (PI Investigator).

Jan 2016 - May 2016 *Design of a helmet based on microwave antennas for brain imaging for stroke diagnosis and treatment*
Funded by University of Iowa Neurosurgery Department. Award amount:

($2,500.00). Investigator/s Fatima Toor (PI Investigator), Ella Wassweiler, Jason Ryan.

Jan 2016 - May 2016 *Faculty Innovators Workshop Grant*
Funded by University of Iowa Ventures and Business School. Award amount: ($3,500.00). Investigator/s Fatima Toor (PI Investigator), Wenqi Duan, Marcie Black (Supporting), Bill Rever (Supporting).

Feb 2015 - Jan 2016 *Realization of epitaxial semiconductor nanowire heterostructures through an innovative approach*
Funded by Office of Vice President of Research and Economic Development (OVPRED). Award amount: ($51,164.00). Investigator/s Fatima Toor (Co-PI), Mubeen Syed (Co-PI), John Prineas (PI Investigator).

Jun 2015 - Dec 2015 *Prototype Development of an Ophthalmic Imaging System using Novel Lenses for Wide-Field Retinal Imaging*
Funded by The University of Iowa Foundation. Award amount: ($20,000.00). Investigator/s Fatima Toor (PI Investigator), Michael Abramoff (PI Investigator).

Jun 2015 - Jun 2015 *Optoelectronic Optimization of a Novel Tandem Structure: Nanostructured 'black Si' and Perovskite Absorbers via Analytical Modeling*
Funded by Office of Vice President of Research and Economic Development (OVPRED). Award amount: ($6,000.00). Investigator/s Fatima Toor (PI Investigator).

Conference Presentations

Research Presentations (since UIowa appointment)

1. **Fatima Toor** (presenter), Sandeep Laroia, Daniel Keefe, "Demonstration of Precise Soft Tissue Ablation by Mid-Infrared Quantum Cascade Laser: Towards Laser-Based Surgical Procedures", 2025 ASLMS Annual Conference, Orlando, FL, USA.
2. Joel Dillman, Sage Marks, and **Fatima Toor**, "3D printed optical cavity for a gas sensor system: Fabrication and Characterization", 2025 UI College of Engineering Research Open House. *Recipient of the Best Undergraduate Research Poster award within the Department of Electrical and Computer Engineering & 1st Position Undergraduate Research Poster award 2025 MATFab Materials Frontier Symposium.*
3. Evan Hagen, Vito Iaia, Yaniv J. Rosen, **Fatima Toor**, "Broadband Terahertz Metamaterial Absorbers", 2025 UI College of Engineering Research Open House. *3rd Position Graduate Research Poster award 2025 MATFab Materials Frontier Symposium.*
4. Zhengyang Li, Sandeep Laroia, and **Fatima Toor**, "Mid-infrared laser interstitial therapy (LITT) technology development via ex vivo soft tissue ablation experiments", 2025 UI College of Engineering Research Open House.
5. Adam Ramker, Zane Shellenbarger, Brian R. Poole, Natalie B. Kostinski, **Fatima Toor**, "Design and Characterization of a Terahertz Quantum Cascade Laser for Fentanyl Detection", 2025 UI College of Engineering Research Open House.
6. Sage Marks, Joel Dillman, and **Fatima Toor, "**Development of an N_2O Gas Sensor System", 2025 UI College of Engineering Research Open House.
7. Robert Schwan III, Daniel Keefe, Sandeep Laroia, **Fatima Toor**, "Soft Tissue Ablation Via Mid-Infrared Lasers for Surgical Applications", 2024 UI College of Engineering Research Open House. *Recipient of the Best Undergraduate Research Poster award within the Department of Electrical and Computer Engineering.*
8. Kaleb McClenathan, Zane Shellenbarger, and **Fatima Toor**, "Quantum Design Simulations for High-Performance Thermophotovoltaic Cells - An Iterated Local Search Algorithm Approach", 2024 UI College of Engineering Research Open House. *Recipient of the Best Undergraduate Research Poster award within the Department of Electrical and Computer Engineering.*
9. **Fatima Toor,** "Scalable Nano and Macro Light Management Approaches for Solar Photovoltaics," 10th International Conference on Materials Science and Nanotechnology for Next Generation, Erciyes University, Turkey (virtual attendance), September 2023. **(Invited)**
10. Daniel Keefe, David T. Christianson, Hiroyuki Oya, Chris Petkov, Matthew Howard, **Fatima Toor**, "Simulating Neuroablation with Intracranial Electrodes: Optical and Bioheat FEM Modeling of Neurosurgical Near-Infrared Laser Interstitial Thermal Therapy", 2023 UI College of Engineering Research Open House. *Recipient of the Best Undergraduate Research Poster award within the Department of Electrical and Computer Engineering.*
11. Xavier Uhrmacher, Sandeep Laroia, **Fatima Toor**, "Optical Fiber Integrated Surgical Balloons: Identifying Bend

Loss Characteristics of Mid-Infrared Laser Coupled Fibers", 2023 UI College of Engineering Research Open House. *Recipient of the Best Undergraduate Research Poster award within the Department of Electrical and Computer Engineering.*

12. Tyler Nelson, Daniel Keefe, Marc Linderman, and **Fatima Toor**, "Portable and Low-Cost Mid-Infrared NDIR Gas Sensor Based on a 3D-Printed Optical Cavity for Monitoring Agricultural N2O Emissions", 2023 UI College of Engineering Research Open House.
13. Kaleb McClenathan, Daniel Keefe, Mark Mba-Wright, and **Fatima Toor**, "Moderate Temperature (300-500°C) Thermophotovoltaics: Improving Efficiency Using Anti-Reflective Coatings and Chemical Etching", 2023 UI College of Engineering Research Open House.
14. **Fatima Toor,** "High sensitivity and low-cost mid-infrared gas sensors for environmental monitoring and health diagnostics: basic R&D to commercialization," XVII TOPFOT and XII EEOF Conference, Tandil, Argentina (virtual attendance), June 2022. **(Invited)**
15. Ryan Edwall II, Daniel Phetmanysay, Caterina Lamuta, Yingjie Romans, Charles Romans, Sandeep Laroia, **Fatima Toor,** "Automation of Paracentesis Robot Prototype Using a Joint Raspberry Pi-Arduino System Controlled by a Graphical User Interface (GUI)." 2022 College of Engineering Research Open House, April 2022. *Recipient of the Best Undergraduate Research Poster award within the Department of Electrical and Computer Engineering.*
16. Greyson Davis, Hiroyuki Oya, Chris Petkov, Matthew Howard, **Fatima Toor,** "Safety Modeling for Measuring Neural Activity During Laser Interstitial Thermal Therapy (LITT)." 2022 College of Engineering Research Open House, April 2022.
17. Daniel Keefe, Hiroyuki Oya, Matthew Howard, Christopher I. Petkov, **Fatima Toor**, "Characterization of Optical Scattering and Absorption in Brain Phantoms for LITT Neurotherapeutics." 2022 College of Engineering Research Open House, April 2022.
18. Jacob Sindt, Bingtao Gao, Wenqi Duan, and **Fatima Toor, "**Scalable Nano and Macro Light Management Approaches for Silicon Photovoltaics", EN04.05: Light Management and New Absorbers, 2021 MRS Fall Virtual Meeting, December 6th, 2021. **(Invited)**
19. Jacob Sindt, Lorena Castro Garcia, Andrea Dodd, Alex Walhof, Peter Thorne, Jun Wang, **Fatima Toor,** "Development of Next Generation Mid-Infrared Sensors for Monitoring Emissions of Greenhouse Gases and Volatile Organic Compounds", Fall Undergraduate Research Festival, Nov 10th, 2021.
20. **Fatima Toor**, "High Performance Mid-Infrared SLEDs and VCSELs – Design Challenges and Innovations", Optica Applied Industrial Optics Conference, 2021. (**Invited**)
21. Kevser Sahin Tiras, Markus Wohlgenannt, **Fatima Toor**, "Comparison of deposition techniques for hybrid perovskite solar cells", Bulletin of the American Physical Society, 2021/3/17.
22. Jacob Sindt and **Fatima Toor**, "Ray Optics Modeling to Determine the Effect of Light Trapping Coatings on Solar Cell Efficiency", College of Engineering Research Open House, University of Iowa, Iowa City, 2020.
23. Dan Keefe, Bingtao Gao, Anthony Rojas Chavez, Rasheid Smith, Hillel Haim, Aliasger Salem, and **Fatima Toor**, "Rapid and Inexpensive Biosensor for Sensitive and Selective Detection of COVID-19", College of Engineering Research Open House, University of Iowa, Iowa City, 2020.
24. Amir Asgharzadeh, Marc Abou Anoma, Adam Hoffman, Chetan Chaudhari, Sushrut Bapat, Richard Perkins, Dan Cohen, Daniel Riley, **Fatima Toor**, Ben Bourne "A Benchmark and Validation of Bifacial PV Irradiance Models", 46th IEEE PVSC Proceedings, 2019. *Finalist for the Best Student Paper Award*
25. Bingtao Gao, Wenqi Duan, **Fatima Toor**, "Efficiency Improvement of Planar Silicon Solar Cells Utilizing Localized Surface Plasmon Resonance of Silver Nanoparticles" 46th IEEE PVSC Proceedings, 2019.
26. Haoxuan You, Zach Lowery, Qinghua Wang, Ruoxing Wang, Caterina Lamuta, **Fatima Toor**, Wenzhuo Wu, Albert Ratner, and Hongtao Ding, "A Novel Laser Patterning Process for Highly Flexible Transparent Conducting Heater", 3rd World Congress on Micro and Nano Manufacturing, 2019.
27. Qinghua Wang, Caterina Lamuta, **Fatima Toor**, Mark Arnold, Hongtao Ding, "Laser-based Metamaterial Fabrication of Flexible THz Optics", 56th Annual Technical Meeting of the Society of Engineering Science (SES2019) Conference, 2019.
28. Qinghua Wang, Michaella Raglione, Huixin Wang, **Fatima Toor**, Mark A. Arnold, and Hongtao Ding, "A Novel Laser-based Metasurface Fabrication Method for Tunable THz Bandpass Optics", 14th Internationl Manufacturing Science and Engineering Conference (MSEC) by ASME, 2019.
29. Qinghua Wang, Avik Samanta, Scott K. Shaw, **Fatima Toor**, and Hongtao Ding, "Colorizing Hydrophobic Ti-6Al-4V Surface via High-Throughput Laser Surface Nanostructuring", 47th North American Manufacturing Research Conference (NAMRC 47), 2019.
30. Avik Samanta, Qinghua Wang, Gurjap Singh, Scott Shaw, **Fatima Toor**, Albert Ratner and Hongtao Ding,

"Nanosecond Pulsed Laser Processing Turns Engineering Metals Antireflective and Superwetting", 47th North American Manufacturing Research Conference (NAMRC 47), 2019.

31. Amir Asgharzadeh, Chris Deline, Joshua Stein, **Fatima Toor**, "A Comparison Study of the Performance of South/North-facing vs East/West-facing Bifacial Modules under Diffuse Shading Conditions", 2018 World Conference on Photovoltaic Energy Conversion (WCPEC-7). *Finalist for the Best Student Paper Award*
32. Wenqi Duan, Bingtao Gao, K A S M Ehteshamul Haque, and **Fatima Toor**, "Performance optimization techniques for the front and back of nanostructured 'black silicon' solar cells", 2018 World Conference on Photovoltaic Energy Conversion (WCPEC-7). *Finalist for the Best Student Poster Award*
33. Xinxin Li, K. Zhang, J. Treu, L. Stampfer, G. Koblmueller, **F. Toor**, J.P. Prineas, "InAs NWs on Si(111) Substrate for Infrared Light Emitting Diodes", MIOMD4-MoA9, 14th International Conference on Mid-IR Optoelectronics: Materials and Devices MIOMD-XIV, 2018.
34. Xinxin Li, Kailing Zhang, **Fatima Toor**, Gregor Koblmueller, and John P. Prineas, "Radiative and Nonradiative Recombination Coefficients of InAs/InAlAs Core-shell Nanowires" CLEO: Science and Innovations, JW2A. 125, 2018.
35. Qinghua Wang, Bao-jia Li, **Fatima Toor**, Hongtao Ding, "A novel laser-based metasurface fabrication (LMF) process for transparent conducting surfaces", Paper # M303, The International Congress on Applications of Lasers & Electro-Optics (ICALEO), 2018.
36. Wenqi Duan, Bingtao Gao, Hui Zhi, Gregory LeFevre, **Fatima Toor**, "High Sensitivity Silicon Nanowire Biosensor for Estrogen Detection in Water Streams", College of Engineering Research Open House, University of Iowa, Iowa City, 2018 - *Winner of the Best Graduate Poster Award!*
37. Joshua Deutsch, Aaron Silva, **Fatima Toor**, "Mie Scattering based Analytical Model to Compute Plasmon Resonances of Metal Nanoparticles", College of Engineering Research Open House, University of Iowa, Iowa City, 2018 - *Winner of the Best Undergraduate Poster Award!*
38. Amir Asgharzadeh Shishavan, Chris Deline, Joshua Stein, **Fatima Toor**, "Impact of Diffuse Shading Conditions on the Performance of Bifacial PV Modules", College of Engineering Research Open House, University of Iowa, Iowa City, 2018 - *Winner of the People's Choice Poster Award (3rd place out of 111 posters)*
39. Aaron Silva, Wenqi Duan, **Fatima Toor**, "Enhanced Absorption of Nano-Textured Silicon through Silver Nanoparticle Decoration", College of Engineering Research Open House, University of Iowa, Iowa City, 2018.
40. Alex Walhof, Kailing Zhang, John Prineas, **Fatima Toor**, "InAs Nanowires for Infrared Optics: Selective Area Epitaxy Growth and Capacitance-Voltage Devices", College of Engineering Research Open House, University of Iowa, Iowa City, 2018.
41. Bingtao Gao, Wenqi Duan, **Fatima Toor**, "Electrical and Optical Performance Optimization of Nanostructured "Black Silicon" Solar Cells", College of Engineering Research Open House, University of Iowa, Iowa City, 2018.
42. Clarissa Dietz*, Wenqi Duan, **Fatima Toor**, "Sol-gel films for biosensors:Process Development and Characterization of Morphology and Optical Properties"
43. Seth Lopez,* Jianchao Xu*, Bingtao Gao, Scott Shaw, **Fatima Toor**, "Exploring Electronic Properties of Ionic Liquids to Improve Components in Solar Cells, Organic Light Emitting Diodes, and Optical Sensors", College of Engineering Research Open House, University of Iowa, Iowa City, 2018.
44. Suram Liyanage*, Constance Erickson*, Rebecca Dodd, Munir Tanas, Ben Miller, **Fatima Toor**, "Analysis of Human and Animal Soft Tissue Sarcoma in the Mid-infrared utilizing an FTIR Spectrometer", College of Engineering Research Open House, University of Iowa, Iowa City, 2018.
45. Xin Jin, **Fatima Toor**, "Development of a broadband visible spectrum metal-dielectric metamaterial film for solar window coating applications", College of Engineering Research Open House, University of Iowa, Iowa City, 2018.
46. Hansen, C. W., Gooding, R., Guay, N., Riley, D. M., Kallickal, J., Ellibee, D., Asgharzadeh, A., Marion, B., **Toor, F.**, Stein, J. S. (2017). A detailed model of rear-side irradiance for bifacial PV modules. 2017 IEEE Photovoltaics Specialists Conference., Washington DC, USA.
47. Asgharzadeh, A., Lubenow, T., Sink, J., Marion, B., Deline, C., Hansen, C., Stein, J., **Toor, F.** (2017). Analysis of the Impact of Installation Parameters and System Size on Bifacial Gain and Energy Yield of PV Systems. 2017 IEEE 44th Photovoltaic Specialists Conference (PVSC), Washington DC, USA.
48. Stein, J. S., Riley, D., Lave, M., Hansen, C., Deline, C., **Toor, F.** (2017). Outdoor Field Performance from Bifacial Photovoltaic Modules and Systems. 44th IEEE Photovoltaic Specialist Conference, Washington DC, USA.
49. Joshua S. Stein, Daniel Riley, Matthew Lave, Chris Deline, **Fatima Toor**, Clifford Hansen, "Outdoor Field Performance from Bifacial Photovoltaic Modules and Systems", 33rd EU PVSEC Proceedings, 2017.
50. Clifford Hansen, Daniel Riley, Matthew Lave, Chris Deline, Amir Asgharzadeh, **Fatima Toor**, Joshua Stein, "A

Detailed Performance Model for Bifacial PV Modules", 33rd EU PVSEC Proceedings, 2017.

51. Zhang, K., Ray, V., Herrera-Fierro, P., Sink, JR, **Toor, F.**, Prineas, J. (2017). Selective-area growth of InAs nanowire arrays on Si3N4/Si (111) by molecular beam epitaxy. Quantum Dots and Nanostructures: Growth, Characterization, and Modeling XIV (vol. 10114, pp. 1011419).
52. Wenqi Duan, **Fatima Toor**, "Surface characterization of nanostructured 'black silicon' using impedance spectroscopy", SPIE Optics and Photonics Conference, 2016.
53. Logan Nichols, Wenqi Duan, **Fatima Toor**, "Thermal characterization of nanoporous 'black silicon' surfaces", SPIE Optics and Photonics Conference, 2016.
54. Amir Asgharzadeh, Leland J. Nordin, Paul J. H. Tjossem, Michael D. Abràmoff, **Fatima Toor**, "PMMA based ophthalmic contact lens for vision correction of strabismus", SPIE Optics and Photonics Conference, 2016.
55. Wenqi Duan, **Fatima Toor**, Munir Tanas, Ben Miller, Michael Henry, and Mohammed Milhem, "Virtual frozen section assessment of surgical margins in sarcoma resection specimens by Fourier Transform Infrared (FTIR) spectroscopy", 9th Holden Comprehensive Cancer Center Retreat, 2016.
56. Amir Asgharzadeh, Eric Forseman, and **Fatima Toor**, "Performance Analysis of Photovoltaic Systems Installed at The University of Iowa Humid Continental Climate Zone: Modeling and Measurements from 2011 to 2014.", 43rd IEEE PVSC Conference, 2016.
57. Clifford W. Hansen, Chris Deline, Sara MacAlpine, Bill Marion, Amir Asgharzadeh, **Fatima Toor**, Joshua S. Stein, "Analysis of Irradiance Models for Bifacial PV Modules.", 43rd IEEE PVSC Conference, 2016.
58. Chris Deline, Sara MacAlpine, Bill Marion, **Fatima Toor**, Amir Shishavan, and Joshua S. Stein, "Evaluation and Field Assessment of Bifacial Photovoltaic Module Power Rating Methodologies.", 43rd IEEE PVSC Conference, 2016.
59. Lauren Davidson, **Fatima Toor**, "Design optimization of thin-film/wafer-based tandem junction solar cells using analytical modeling", SPIE OPTO 9743-22, 2016.
60. **Fatima Toor**, Ananda Carl Guneratne, Marina Temchenko, "Metal-dielectric frequency selective surface for high performance solar window coatings", SPIE OPTO 9756-63, 2016.
61. **Fatima Toor**, Ananda Carl Guneratne, "Modeling refractive metasurfaces in series as a single metasurface", SPIE OPTO 9756-11, 2016.
62. Amir Asgharzadeh, Eric Forseman, and **Fatima Toor**, "Performance Analysis of Photovoltaic Systems Installed at The University of Iowa Humid Continental Climate Zone: Modeling and Measurements from 2011 to 2014.", 43rd IEEE PVSC Conference, 2016.
63. Joshua Larson, **Fatima Toor**, "Optical design of a compact near-infrared multispecies gas sensor," 2016 APS March Meeting, Baltimore, MD. (March 14, 2016).
64. Ella Wassweiler, John Prineas, **Fatima Toor**, "Towards the design of high performance IR photonics: Optical analysis of textured gallium antimonide surfaces," 2016 American Physical Society, Baltimore, MD. (March 14, 2016).
65. **Fatima Toor**, Ananda Guneratne, Marina Temchenko, "Metal-dielectric frequency selective surface for high performance solar window coatings," 2016 SPIE Photonics West, San Francisco, CA. (February 18th, 2016).
66. Lauren Davidson, **Fatima Toor**, "Design optimization of thin-film/wafer-based tandem junction solar cells using analytical modeling," 2016 SPIE Photonics West, San Francisco, CA. (February 16th, 2016).
67. **Fatima Toor**, Ananda Guneratne, "Modeling refractive metasurfaces in series as a single metasurface," 2016 SPIE Photonics West, San Francisco, CA. (February 15th, 2016)
68. **Fatima Toor**, “High Performance Solar Cells and Coatings using Optical Metamaterials” Optical Science and Technology Center Annual Symposium, University of Iowa, Iowa City, 2015. (Invited)
69. Ananda Guneratne and **Fatima Toor**, “Nanostructured Selectively Reflecting Surfaces for Solar Applications”, Optical Science and Technology Center Annual Symposium, University of Iowa, Iowa City, 2015.
70. Jason W. Ryan and **Fatima Toor**, “Automation of a C-V Measurement System using LabView for Semiconductor Analysis”, College of Engineering Research Open House, University of Iowa, Iowa City, 2015
71. Eric M. Gansemer and **Fatima Toor**, “Design optimization of a Si/Perovskite Tandem Solar Cell”, College of Engineering Research Open House, University of Iowa, Iowa City, 2015.
72. Ananda Guneratne and **Fatima Toor**, “Nanostructured Selectively Reflecting Surfaces for Solar Applications”, College of Engineering Research Open House, University of Iowa, Iowa City, 2015.
73. **Fatima Toor**, “High Performance Optoelectronics for Chemical Sensing and Energy Generation Applications” Spring 2015 Grinnell College Physics Symposium, Grinnell College, Grinnell, Iowa, 2015.
74. **Fatima Toor**, “High Performance Optoelectronics for Chemical Sensing Applications”, Department of Chemistry Spring Physical and Environmental Seminar Series, Chemistry Department, University of Iowa, Iowa City, 2015.

(Invited)

75. **Fatima Toor**, "High Performance Optoelectronics for Chemical Sensing and Energy Generation Applications", Fall 2014 Graduate Research Seminar, Electrical and Computer Engineering Department, University of Iowa, Iowa City, 2014.
76. **Fatima Toor**, "Engineering Physics for Designing Multi-Colored Light Sources and Detectors", Physics and Astronomy Department, University of Iowa, Iowa City, 2014.
77. **Fatima Toor**, "High Performance Optoelectronics for Chemical Sensing and Energy Generation Applications", Optical Science and Technology Center Symposium, University of Iowa, Iowa City, 2014.

Research Presentations (prior to UIowa appointment)

65. **Fatima Toor**, "$1/W System Price: How Bifacial Modules will Beat the Needed Efficiency and Cost Targets", Bifacial Photovoltaic Workshop, Chambery, France, 2014. (Invited)
66. **Fatima Toor,** "PV Innovation: A Global and Local Perspective", SEMI Texas Fall Outlook, Austin, TX, 2013. (Invited)
67. **Fatima Toor**, "Innovation as the key solution to surviving in the PV industry shakeout", PV Rollout Conference, Georgia, GA, 2013.
68. **Fatima Toor**, "Strategies to survive the treacherous PV industry market conditions", PV Japan, Tokyo, Japan, 2012. (Invited)
69. **Fatima Toor**, "Key issues and innovations in photovoltaic metallization", 2012 Radtech Technical Conference, Chicago, IL, 2012. (Invited)
70. **Fatima Toor**, "Searching for game changers: sorting through next generation photovoltaic technologies that drive down $/W", IMAPS NE 39th Symposium and Expo, Marlborough, MA, 2012. (Invited)
71. **Fatima Toor**, "Opportunities in the turbulent photovoltaic equipment market", Webinar, December 2012.
72. **Fatima Toor**, "Readying for solar's renaissance: Tomorrow's winners of today's PV innovation", Webinar, June 2012.
73. Jihun Oh, **Fatima Toor**, Hao-Chih Yuan and Howard Branz, ""High efficiency black Si solar cells with no antireflection coating", Proceedings of 21st Workshop on Crystalline Silicon Solar Cells & Modules: Materials and Process, Breckenridge, CO, 2011.
74. **Fatima Toor**, Matthew R. Page, Howard M. Branz and Hao-Chih Yuan, "17.1%-efficient multi-scale-textured black silicon solar cells without dielectric antireflection coating", 37th IEEE Photovoltaic Specialists Conference, Seattle, WA, 2011.
75. Zhihao Jiang, Seokho Yun, **Fatima Toor**, Douglas Werner and Theresa Mayer, "Experimental demonstration of a conformal optical metamaterial absorber", IEEE AP-S International Symposium on Antennas and Propagation and 2011 USNC/URSI National Radio Science Meeting, Spokane, WA, 2011.
76. **Fatima Toor,** William B. Nemeth, Matthew R. Page, Qi Wang, Howard M. Branz and Hao-Chih Yuan, "Efficient black silicon solar cells with multi-scale surface texture", 2011 APS March Meeting, Dallas, TX, 2011.
77. **Fatima Toor**, Falah Hasoon, Matthew Page, William Nemeth, Qi Wang, Bobby To, Howard Branz, Hao-Chih Yuan, "Optical and electrical characteristics of pyramid-textured black silicon solar cells", MRS Workshop Series Fall 2010 Topic B: Photovoltaic Materials and Manufacturing Issues, Denver, CO, 2010.
78. Zhihao Jiang, Seokho Yun, **Fatima Toor**, Douglas Werner and Theresa S. Mayer, "Design, fabrication and characterization of wide-angle polarization-insensitive optical metamaterial absorbers", MRS Fall 2010 Meeting, Boston, MA, 2010.
79. Zhihao Jiang, **Fatima Toor**, Seokho Yun, Zikri Bayraktar, Xiande Wang, Douglas Werner, Theresa Mayer and Ping Werner, "Metamaterial absorbers with wide-angle polarization-insensitive multiband properties for RF through mid-infrared applications", Fourth International Congress on Advanced Electromagnetic Materials in Microwaves and Optics, Karlsruhe, Germany, 2010. (Invited)
80. Rafal Lewicki, Anatoliy Kosterev, **Fatima Toor**, Yu Yao, Claire Gmachl, Xiaojun Wang, Mary Fong, Frank K. Tittel "Laser absorption spectroscopy based on a 7.74 μm quantum cascade laser source for UF_6 analytical enrichment measurements", SPIE Photonics West Conference, San Francisco, CA, 2010.
81. **Fatima Toor**, Scott Howard, Deborah L. Sivco and Claire F. Gmachl "Four-wavelength quantum cascade laser source for compact medical and environmental sensors", Bernard M. Gordon Center for Subsurface Sensing and Imaging Systems Research and Industrial Collaboration Conference, Northeastern University, Boston, MA, 2009.
82. **Fatima Toor**, Deborah L. Sivco and Claire F. Gmachl, "Temporal wavelength multiplexing of a quantum cascade laser", Indium Phosphide and Related Materials (IPRM) Conference, Newport Beach, CA, 2009.
83. Nikolai Stelmakh, Michael Vasilyev, **Fatima Toor** and Claire F. Gmachl, "Degenerate and non-degenerate lateral

mode patterns in mid-IR quantum cascade lasers", CLEO/QELS Conference, Baltimore, MD, 2009.
84. **Fatima Toor**, Deborah L. Sivco and Claire F. Gmachl, "Temporal wavelength multiplexing of a quantum cascade laser", APS March Meeting, Pittsburgh, PA, 2009.
85. **Fatima Toor**, Deborah L. Sivco and Claire F. Gmachl, "Effect of waveguide side-wall roughness on the performance of quantum cascade lasers", SPIE Photonics West, San Jose, CA, 2009.
86. Ekua N. Bentil, **Fatima Toor**, Anthony J. Hoffman, Matthew D. Escarra and Claire F. Gmachl, "Rapid and minimally invasive quantum cascade wafer testing", SPIE Photonics West, San Jose, CA, 2009.
87. Nikolai Stelmakh, Michael Vasilyev, **Fatima Toor** and Claire F. Gmach, "Lateral mode structure of wide-ridge quantum cascade lasers", 39th Winter Colloquium of the Physics of Quantum Electronics, Snowbird, UT, 2009.
88. **Fatima Toor**, Scott Howard, Deborah L. Sivco, and Claire F. Gmachl, "A compact four-wavelength quantum cascade laser source", IEEE LEOS Meeting, New Port Beach, CA, 2008.
89. Ekua N. Bentil, **Fatima Toor**, Anthony Hoffman and Claire F. Gmachl, "Quantum cascade laser wafer testing using intersubband optical absorption and emission spectroscopy", International Quantum Cascade Lasers School & Workshop, Monte Verita, Switzerland, 2008.
90. **Fatima Toor**, Deborah L. Sivco and Claire F. Gmachl, "Effects of waveguide side-wall roughness on quantum cascade laser performance", MIRTHE Summer School, Johns Hopkins University, Baltimore, MD, 2008.
91. Ekua N. Bentil, **Fatima Toor**, Anthony J. Hoffman, Matthew D. Escarra and Claire F. Gmachl, "Rapid and minimally invasive quantum cascade wafer testing", MIRTHE Summer School, Johns Hopkins University, Baltimore, MD, 2008.
92. **Fatima Toor**, Hao E. Liu, Deborah L. Sivco and Claire F. Gmachl, "Effects of waveguide side-wall roughness on quantum cascade laser performance", APS March Meeting, New Orleans, LA, 2008.
93. **Fatima Toor**, Scott S. Howard, Deborah L. Sivco and Claire F. Gmachl**,** "Four-wavelength quantum cascade laser source for compact spectroscopic systems", APS March Meeting, New Orleans, LA, 2008.
94. **Fatima Toor**, Scott S. Howard, Deborah L. Sivco and Claire F. Gmachl**,** "Four-wavelength quantum cascade laser source for compact spectroscopic systems", PRISM/PCCM/MIRTHE/CNSA Symposium, Princeton, NJ, 2008.
95. Ekua N. Bentil, **Fatima Toor**, Zhijun Liu and Claire F. Gmachl, "Quantum cascade laser wafer testing using intersubband optical absorption and emission spectroscopy", PRISM/PCCM/MIRTHE/CNSA Symposium, Princeton, NJ, 2008.
96. **Fatima Toor**, Scott S. Howard, Deborah L. Sivco and Claire F. Gmachl, "Four-wavelength quantum cascade laser source for compact spectroscopic systems", MIRTHE Summer School, Princeton University, Princeton, NJ, 2007.
97. **Fatima Toor**, Kale Franz, Anthony Hoffman, Scott Howard, Daniel Wasserman, Claire Gmachl, Kuen-Ting Shiu, Stephen R. Forrest, Alexey Belyanin and Deborah .L. Sivco, "Novel QC laser designs for multi-wavelength operation: (i) Difference Frequency Generation (DFG), (ii) Dual Active Cores, and (iii) Cascaded QC lasers", PRISM/PCCM/MIRTHE Symposium, Princeton, NJ, 2007.
98. **Fatima Toor**, Yves Martin, Theodore Van Kessel and Matthew Colburn, "Imprint Lithography", IBM Co-op Research Symposium, IBM T.J. Watson Research Labs, Yorktown Heights, NY, 2004.
99. **Fatima Toor**, Dominick Posillico and Ron Nunes, "Process Optimization for Negative Photoresists", IBM Co-op Research Symposium, IBM T.J. Watson Research Labs, Yorktown Heights, NY, 2003.

SERVICE

Profession

2019 - 2025	Natural Sciences and Engineering Research Council of Canada, Discovery Grants (Member, Electrical Engineering Subgroup), Reviewer, Grant Proposals
2024 - 2025	SPIE the international society for optics and photonics, Associate Editor SPIE Journal of Nanophotonics, Editorial Board
2021 - 2024	SPIE the international society for optics and photonics, Publications Committee, Member
2020 - 2020	U.S. DOE Technology Commercialization Fund, Reviewer, Grant Proposals
2018 - 2024	SPIE the international society for optics and photonics, Associate Editor SPIE Journal of Photonics for Energy, Editorial Board
2016 - Present	U.S. DOE Basic Energy Sciences, Reviewer, Grant Proposals
2016 - Present	National Science Foundation, EPMD, STTR, SBIR, IIBR, HDR-DRISE, Reviewer, Grant Proposals
2008 - Present	APS, SPIE, IEEE, ACS, MRS, Reviewer, Publications, Reviewer for Physica Status Solidi A: Applications and Materials Science, Langmuir, IEEE Journal of Photovoltaics, ACS Journal of Applied Electrochemistry, Progress in Photovoltaics, OSA Optics Express, OSA Biomedical

	Optics Express, SPIE Journal of Photonics for Energy, Solar Energy, RSC Energy & Environmental Science, Journal of Applied Physics D, Semiconductor Science and Technology Journal, Superlattices and Microstructures Journal
2018 - 2020	Optical Society of America, Technical Group Development Chair, Board of Directors
2018 - 2019	University of Iowa Solar Car Team, Board of Advisors
2018 - 2019	2019 Photonics North Conference, Green Photonics, Energy and Related Technologies, Co-Chair
2018 - 2019	SPIE the international society for optics and photonics, SPIE JPE Special Section on Solar Energy Solutions for Electricity and Water Supply in Rural Areas, Editor
2019	National Defense Science and Engineering Graduate (NDSEG) Fellowships, Graduate Fellowships, Reviewer, Grant Proposals
2016 - 2019	Optical Society of America, Laser Systems Technical Group, Chair
2018	Optical Society of America, Lead Feature Editor OSA Biomedical Optics Express Journal: "Mid-infrared lasers for medical applications"
2018	Optical Society of America, Volunteer
2018	Natural Sciences and Engineering Research Council of Canada, Strategic Partnership Grant Project, Reviewer, Grant Proposals
2016 - 2018	SPIE the international society for optics and photonics, Guest Editor for Special Section of the SPIE Journal of Photonics for Energy (JPE) on Tandem Junction Solar Cells, Editor, https://www.spiedigitallibrary.org/journals/journal-of-photonics-for-energy/volume-8/issue-02/022600/Special-Section-Guest-Editorial-Tandem-Junction-Solar-Cells/10.1117/1.JPE.8.022600.full?SSO=1
2018	National Defense Science and Engineering Graduate (NDSEG) Fellowships, Graduate Fellowships, Reviewer, Grant Proposals
2017	2017 Photonics North Conference, Green Photonics, Energy and Related Technologies, Co-Chair
2017	Lead Feature Editor for OSA Applied Optics Journal: Near- to mid-IR (1-13 μm) III-V Semiconductor Lasers, Editor

Department

2022 – Present	Graduate Committee, Member
2014 – 2022	Undergraduate Committee, Member
2017 - Present	ECE Senior Design Mentor sponsoring capstone projects
2016 – 2017 2024 – 2025	ECE Faculty Secretary

University

2024 - 2027	Member, University of Iowa Faculty Senate Research Council, UI OVPR
2022 - 2024	Chair, University of Iowa Faculty Senate Research Council, UI OVPR
2017 - 2019	WISE Advisory Board, Member
2017 - 2019	Women's Conference University of Iowa, Member
2016 - 2019	IP Enhancement Project Sponsored by OVPR's Office, Researcher, UV dental file project where I provide expertise on the photonics aspects of the prototype development.
2019	CGRER Grant Reviewer, Reviewer, Grant Proposals
2018 - 2019	Microscopy Equipment Evaluation Committee for CMRF, Member
2018	2018 Honors Scholarship, Reviewer
2017	TEConomy Medical Device Advising Group Organized by the OVPR's Office, Member, Gather insight from the group members regarding opportunities for advancing the Medical Device platform, areas of focus and specific potential at UI, and preliminary discussion of potential strategy and action areas.