

Dr. Can Bayram,

Ph.D. in Electrical Engineering (Solid State and Photonics)

IBM Research, Thomas J. Watson Research Center, Yorktown Heights, NY, USA

EDUCATION:

06/2011 Ph.D. ([Electrical Eng.](#)) [Northwestern University](#), IL, USA
06/2005 B.S. ([Electrical Eng.](#)) [Bilkent University](#), Ankara, Turkey
06/2001 Diploma Izmir Science High School, Izmir, Turkey
06/1998 Diploma Izmir Bornova Anatolian High School, Izmir, Turkey

PROFESSIONAL POSITIONS:

present **Position Title:** Research Scientist,
- **Company Information:** International Business Machines (IBM),
06/2011 **IBM Manager:** [Dr. Devendra Sadana](#): Manager, IBM Research, Thomas J. Watson Research Center, Yorktown Heights, NY, USA
Research Area: Development of III-V based semiconductor device technologies.

06/2011 **Position Title:** Research Fellow,
- **IBM Mentor:** [Dr. Devendra Sadana](#): Manager, IBM Research, Thomas J. Watson Research Center, Yorktown Heights, NY, USA
09/2010 **Research Area:** Widebandgap (AlGaInN and MgZnO) Optoelectronic Devices
He has addressed existing science and technology problems, and developed innovative approaches to society's needs via development of novel optoelectronic devices. His project focus has been twofold: On the lower spectral end **ultraviolet** and on the higher spectral end **terahertz** wavelength regimes.

06/2011 **Position Title:** Energy Fellow,
- **Link Foundation Mentor:** [Prof. Lee Rybeck Lynd](#): Manager, Link Foundation Energy Programs, Thayer School of Engineering, Dartmouth College, NH, USA
06/2010 **Research Area:** Widebandgap (AlGaInN and MgZnO) Optoelectronic Devices
He has innovated ZnO – InGaN hybridization approach for applications in visible light emitters. He enabled higher spectral quality and efficient green LEDs that fulfills the green gap and enables white LEDs based on color-mixing (the most energy efficient method of white light generation) leading to commercial applications such as TVs and novel display systems. The study of these hybrid LEDs have been listed as one of the [Top 20 Most Downloaded Articles](#) in Applied Physics Letters, and was awarded [Dow Sustainability Student Innovation Award](#) (\$10,000) held by Dow Chemical Company.

06/2010

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09/2005

Position Title: Research Assistant,

Faculty Supervisor: [Prof. Manijeh Razeghi](#); Walter P. Murphy Professor and Director of Center for Quantum Devices, Department of Electrical Engineering and Computer Science, Northwestern University, IL, USA

Research Area: Widebandgap (AlGaInN and MgZnO) Optoelectronic Devices

His Ph.D. research area has been wide bandgap semiconductor devices including III-N materials (AlGaInN) and II-VI materials (ZnO). His PhD work includes semiconductor device design/simulation, material growth/characterization, device processing/packaging/measurement.

He has performed more than 3000 MOCVD growths throughout his appointment. He has improved $\text{Al}_x\text{Ga}_y\text{In}_{(1-x-y)}\text{N}$ layers (where $[0,0] < [x, y] < [1,1]$), and integrated them into self-designed nitride optoelectronic devices. By using state of the art material characterization techniques such as atomic force microscopy, scanning electron microscopy, photoluminescence measurements, X-ray diffraction measurements, and Hall effect measurements, he has correlated the material growth, characterization and (structural (surface, crystallographic), optical, electrical) material quality that led to world's first and world's highest performance nitride optoelectronic devices.

By using conventional and state-of-the-art semiconductor fabrication techniques and equipments (such as rapid thermal annealing, electron cyclotron resonance reactive ion etching, electron beam metal evaporator, plasma-enhanced chemical vapor deposition, photo- and e-beam-lithography systems), he has fabricated more than 300 wide bandgap semiconductor devices ranging from UV APDs to blue and green LEDs. Combining the device performance with the material growth, a unique blend of semiconductor knowledge has been gathered.

His tasks have been the growth, characterization, fabrication and measurement of AlGaInN based optoelectronic devices. He has been responsible for the MOCVD growth of AlGaInN based all optoelectronic devices ranging from electro-optical modulators to ultraviolet single photon detectors, ultraviolet to visible LEDs and LDs, and transistors. Towards end of his appointment, he has developed high quality Al(Ga)N/GaN superlattices for intersubband devices operating in near- and mid-infrared targeting for THz wavelength regime.

05/2005

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05/2004

Position Title: Research Assistant,

Faculty Supervisor: [Prof. Abdullah Atalar](#); University President, and Professor, Department of Electrical Engineering, Bilkent University, Ankara, Turkey

Research Area: Capacitive Micromachined Ultrasonic Transducers

He has conducted research in the field of micromachined sensors. He has improved the design of the capacitive Micromachined Ultrasonic Transducers (cMUTs). His results have been published in IEEE - UFFC 2005 Rotterdam. He is the recipient of the 500\$ Student Travel Award at IEEE - UFFC 2005 Rotterdam with this research.

- 08/2003 **Position Title:** Research Intern,
 - **Internship Location:**, [ASELSAN](#), Ankara, Turkey
- 05/2003 **Research Area:** [Communication and Information Technologies](#)
 He has worked in the Communications Division and focused on the network systems, and their utilities in the communications. Particularly, he has examined IP, ATM, and MPLS, GMPLS and focused on new technological network systems MPLS and GMPLS mostly.
- 09/2002 **Position Title:** Visiting Researcher,
 - **Faculty Supervisor:** [Prof. Butrus T. Khuri Yakub](#); Professor, Department of
 06/2002 Electrical Engineering, Stanford University, CA, USA
Research Area: Ultrasonic Microelectromechanical Systems
 He has worked as a member of Ultrasonic Group and developed a technique to make 3-D field analysis of transducers with 1 mm accuracy. A 3-D moving mechanical structure software, necessary high accuracy arm designs (in ANSYS), Lab view codes for coordination of the mechanical (Unidex Positioning System), AC supply, DC supply and oscilloscope are created and developed. The project was successfully completed. The set-up he developed in Stanford University was used in ultrasonic field characterization, was referenced in published papers.

HONORS AND AWARDS:

- **Research Fellow** ([International Business Machines Corporation](#))
- **Energy Fellow** ([Link Foundation](#))
- **Engineer of the Year** ([Boeing Company](#))
- **Sustainability Innovator** ([Dow Chemical Company](#))
- **PhD Fellow** ([IEEE Electron Devices Society](#))
- **PhD Fellow** ([IEEE Photonics Society](#))
- **Laser Technology, Engineering, and Applications Scholar** ([SPIE Society](#))
- **Ludo Frevel Crystallography Scholar** ([ICDD](#))
- **Travel Award** ([IEEE Ultrasonics, Ferroelectrics and Frequency Control Society](#))
- **High Honors Graduation** ([Bilkent University](#))
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RESEARCH STATEMENT:

Explore the physics behind quantum structures and engineer atomic arrangements in semiconductors in realization of ultraviolet to terahertz optoelectronic devices and novel electronic devices.

MISSION STATEMENT:

Improve the health and well-being of the community through environmentally benign, cost-effective, energy-efficient, and sustainable innovative solutions in semiconductors.

TEACHING EXPERIENCE:

Mentor, Center for Quantum Devices, Northwestern University, 2005-2011

- Teaching visiting (under)graduate interns semiconductor device growth, processing and measurement (more than 20 students).
- Working with Northwestern University undergraduates for their independent study courses (more than 5 students).
- Mentoring incoming graduate students (more than 20 students).

Mentor, Electrical Engineering Department, Bilkent University, 2002-2005.

- Teaching physics and mathematics to more than 50 undergraduates.

Mentor, Izmir Science High School, 1998-2001.

- Training new physics Olympic team members (more than 10 students).

PROFESSIONAL AND HONORARY SOCIETIES:

2012 – present:	Member,	Turkish American Scientists and Scholars Association (TASSA)
2011 – present:	Member,	American Chemical Society (ACS)
2010 – present:	Elected Affiliate,	International Centre for Diffraction Data (ICDD)
2010 – present:	Associate Member,	Institute of Physics (IOP)
2009 – present:	Member,	Electrochemical Society (ECS)
2009 – present:	Member,	American Association for the Advancement of Science (AAAS)
2009 – present:	Member,	IEEE Electron Devices Society (IEEE - EDS)
2008 – present:	Member,	American Physical Society (APS)
2008 – present:	Member,	Materials Research Society (MRS)
2007 – present:	Member,	IEEE Photonics Society
2006 – present:	Member,	International Society for Optics and Photonics (SPIE)
2005 – present:	Member,	Optical Society of America (OSA)
2005 – present:	Member,	Institute of Electrical and Electronics Engineers (IEEE)

PROFESSIONAL ACTIVITIES:

Proposal Reviewer	U.S. Department of Energy (DOE)
Organizing Committee	2013 SPIE Photonics West (Quantum Sensing and Nanophotonic Devices)
Referee	APS Journals (<i>Applied Physics Letters, Journal of Applied Physics, AIP Advances</i>) OSA Journals (<i>Optics Express, Optical Materials Express, Optics Letters, Journal of the Optical Society of America A, Applied Optics</i>) IOP Journals (<i>Journal of Physics D, Nanotechnology, Semiconductor</i>)

Science and Technology)

IEEE Journals (*Journal of Quantum Electronics, Photonics Technology Letters*)

ECS Journals (*Journal of the Electrochemical Society, Electrochemical and Solid-State Letters, Measurement Science and Technology, Solid State Science and Technology*)

Elsevier Journals (*Solid State Electronics, Thin Solid Films*)

Springer Journals (*Applied Physics B*)

Treasurer

2009-2010 Northwestern University SPIE Chapter

2009-2010 Northwestern University Photonics Society

KEY RESEARCH ACCOMPLISHMENTS:

- 2012 [APL 100, 053901](#) Highest efficiency (28.7%) thin film solar cells by controlled spalling
- 2012 [JAP 111, 013514](#) First pulsed layer-by-layer deposition of $\text{Al}_x\text{Ga}_{(1-x)}\text{N}$ ($0.5 < x$)
- 2010 [Proc. SPIE 8268](#) First reliable III-nitride resonant tunneling diodes
- [APL 97, 181109](#) First reliable negative differential resistance in GaN materials
- [APL 97, 092104](#) observed at both low and room temperature & under both biases
- 2010 [APL 96, 261107](#) Highest efficiency filter-free UV single photon detectors
- 2010 [APL 96, 201908](#) First nonpolar UV APDs
- 2010 [APL 96, 042103](#) First MOCVD-grown III-Nitride resonant tunneling diodes (RTDs)
- 2009 [APL 95, 131109](#) Longest wavelength ISB absorbance in III-Nitrides
- 2009 [APL 95, 201906](#) Shortest wavelength ISB absorbance in III-Nitrides via MOCVD
- [APL 94, 121902](#)
- 2009 [APL 94, 121902](#) First pulsed superlattice deposition for intersubband (ISB) devices
- 2009 [AP A 96, 403](#) First room temperature green emitting InGaN quantum dots
- 2008 [APL 93, 08111](#) First novel ZnO-InGaN hybrid green light emitting diodes (LEDs)
- 2008 [APL 93, 221104](#) First nanopillar UV photodiodes
- 2008 [APL 93, 211107](#) Highest quantum efficiency UV APDs
- 2008 [APL 92, 241103](#) Highest gain in UV APDs
- 2008 [JAP 104, 083512](#) Highest quality *p*-GaN
- 2008 [APL 92, 101120](#) First separate absorption and multiplication UV APDs
- 2007 [APL 91, 041104](#) First filter-free UV single photon detector
- 2007 [APL 90, 141112](#) First back-illuminated ultraviolet (UV) avalanche photodiodes (APDs)
- 2005 [Proc.IEEE UFFC](#) First mixed-sized cMUT arrays

SELECTED ARTICLES ABOUT RESEARCH THAT HAVE APPEARED IN POPULAR PRESS AND JOURNALS:

- “High-efficiency thin-film InGaP/InGaAs/Ge tandem solar cells enabled by controlled spalling technology”, [TOP 20 Most Downloaded Articles](#), *Applied Physics Letters*, 02/2012.
- “UV APD improved by m-plane free-standing GaN substrate”, [Semiconductor Today](#), 05/26/2010.

- “Nitrides push performance of UV photodiodes”, [Laser Focus World](#), 9/2009.
- “ULTRAVIOLET DETECTORS: Nitrides push performance of UV photodiodes”, [OptoIQ](#), 9/1/2009.
- “GaN nanopillar p-i-n photodiodes”, [TOP 20 Most Downloaded Articles](#), *Applied Physics Letters*, 12/2008.
- “ZnO does away with green-LED problem”, [Laser Focus World](#), 11/2008.
- “ZnO does away with green-LED problem”, [OptoIQ](#), 11/1/2008.
- “ZnO/GaN hybrid shows green LED promise”, [Compound Semiconductor](#), 11/2008.
- “A hybrid green light emitting diode comprised of *n*-ZnO/(InGaN/GaN)/ multi-quantum-wells/ *p*-GaN”, [TOP 20 Most Downloaded Articles](#), *Applied Physics Letters*, 12/2008.
- “Tiny Avalanche Photodiode Detects Single UV Photons”, [ScienceDaily](#), 1/2/2008.
- “Tiny Avalanche Photodiode Detects Single UV Photons”, [Science Centric](#), 1/29/2008.
- “Tiny Avalanche Photodiode Detects Single UV Photons”, [SPIE Newsroom](#), 1/29/2008.
- “The Brighter Side of Semiconductors”, [Semiconductor International](#), 6/1/2007.
- “The consummate collaborator”, [McCormick Magazine](#), Spring 2007.
- “Bioterror Defense”, [Northwestern Magazine](#), Spring 2006.
- “Tiny Avalanche Photodiodes Target Bioterrorism Agents”, [McCormick News](#), 09/29/2005.
- “Tiny Avalanche Photodiodes Target Bioterrorism Agents”, [Science Daily](#), 09/14/2005.

BIBLIOGRAPHY:

Publications

Journal Articles:

27. D. Shahrjerdi, S. W. Bedell, C. Ebert, **C. Bayram**, B. Hekmatshoar, K. Fogel, P. Lauro, M. Gaynes, T. Gokmen, J. Ott, and D. K. Sadana, "High-Efficiency Thin-Film InGaP/InGaAs/Ge Tandem Solar Cells Enabled By Controlled Spalling Technology," [Applied Physics Letters 100, 053901 \(2012\)](#).
26. **C. Bayram**, "High quality AlGaIn/GaN superlattices for near- and mid-infrared intersubband transitions," [Journal of Applied Physics 111, 013514 \(2012\)](#).
25. **C. Bayram**, Z. Vashaei, and M. Razeghi, "Reliability in room-temperature negative differential resistance characteristics of low-aluminium-content AlGaIn/GaN double-barrier resonant tunneling diodes," [Applied Physics Letters 97, 181109 \(2010\)](#).
24. Z. Vashaei, **C. Bayram**, P. Lavenus, and M. Razeghi. "Photoluminescence characteristics of polar and nonpolar AlGaIn/GaN superlattices," [Applied Physics Letters 97, 121918 \(2010\)](#).
23. **C. Bayram**, Z. Vashaei, and M. Razeghi, "Room temperature negative differential resistance characteristics of polar III-nitride resonant tunneling diodes," [Applied Physics Letters 97, 092104 \(2010\)](#).
22. E. Cicek, Z. Vashaei, R. McClintock, **C. Bayram**, and M. Razeghi, "Geiger-mode operation of ultraviolet avalanche photodiodes grown on sapphire and free-standing GaN substrates," [Applied Physics Letters 96, 261107 \(2010\)](#).
21. Z. Vashaei, E. Cicek, **C. Bayram**, R. McClintock, and M. Razeghi, "GaN avalanche photodiodes grown on *m*-plane freestanding GaN substrate," [Applied Physics Letters 96,](#)

- [201908 \(2010\)](#).
20. Z. Vashaei, **C. Bayram**, and M. Razeghi, "Demonstration of negative differential resistance in GaN/AlN resonant tunneling diodes at room temperature," [Journal of Applied Physics 107, 083505 \(2010\)](#).
 19. **C. Bayram**, Z. Vashaei, and M. Razeghi, "AlN/GaN double-barrier resonant tunneling diodes grown by metal-organic chemical vapor deposition," [Applied Physics Letters 96, 042103 \(2010\)](#).
 18. **C. Bayram**, N. Péré-Laperne, and M. Razeghi, "Effects of well width and growth temperature on optical and structural characteristics of AlN/GaN superlattices grown by metal-organic chemical vapor deposition," [Applied Physics Letters 95, 201906 \(2009\)](#).
 17. N. Péré-Laperne, **C. Bayram**, L. Nguyen-Thê, R. McClintock, and M. Razeghi, "Tunability of Intersubband absorption from 4.5 to 5.3 μm in a GaN/Al_{0.2}Ga_{0.8}N superlattices grown by metalorganic chemical vapor deposition," [Applied Physics Letters 95, 131109 \(2009\)](#).
 16. **C. Bayram** and M. Razeghi, "ULTRAVIOLET DETECTORS: Nitrides push performance of UV photodiodes," [Laser Focus World 45\(9\), p. 47-51 \(2009\)](#).
 15. **C. Bayram**, D. Rogers, F. H. Teherani, and M. Razeghi, "Fabrication and Characterization of Novel Hybrid Green LEDs Based on Substituting n-type ZnO for n-type GaN in an Inverted p-n Junction," [Journal of Vacuum Science and Technology B 27, 1784 \(2009\)](#).
 14. V. E. Sandana, D. J. Rogers, F. H. Teherani, R. McClintock, **C. Bayram**, M. Razeghi, H.-J. Drouhin, M.C. Clochard, V. Sallet, G. Garry, and F. Falyouni, "Comparison of ZnO Nanostructures Grown Using pulsed layer deposition, metalorganic chemical vapor deposition, and physical vapor transport", [Journal of Vacuum Science and Technology B 27, 1678 \(2009\)](#).
 13. **C. Bayram**, N. Péré-laperne, R. McClintock, B. Fain and M. Razeghi, "Pulsed Metalorganic Chemical Vapor Deposition of High Quality AlN/GaN Superlattices for Near-Infrared Intersubband Transitions," [Applied Physics Letters 94, 121902 \(2009\)](#).
 12. **C. Bayram** and M. Razeghi, "Stranski-Krastanov growth of InGaN quantum dots emitting in green spectra," [Applied Physics A: Materials Science & Processing 96, 403 \(2009\)](#).
 11. **C. Bayram**, J. L. Pau, R. McClintock, and M. Razeghi, "Comprehensive study of blue and green multi-quantum-well light emitting diodes grown on conventional and lateral epitaxial overgrowth GaN," [Applied Physics B: Lasers and Optics 95, 307 \(2009\)](#).
 10. J. L. Pau, **C. Bayram**, P. Giedraitis, R. McClintock, and M. Razeghi, "GaN nanostructured p-i-n photodiodes," [Applied Physics Letters 93, 221104 \(2008\)](#).
 9. **C. Bayram**, J. L. Pau, R. McClintock, M. Razeghi, M. P. Ulmer, and D. Silversmith, "High Quantum Efficiency Back-illuminated GaN Avalanche Photodiodes," [Applied Physics Letters 93, 211107 \(2008\)](#).
 8. **C. Bayram**, F. H. Teherani, D. Rogers, and M. Razeghi, "A hybrid green light-emitting diode comprised of n-ZnO/(InGaN/GaN) multi-quantum wells/p-GaN," [Applied Physics Letters 93, 081111 \(2008\)](#).
 7. **C. Bayram**, J. L. Pau, R. McClintock, and M. Razeghi, "Performance enhancement of GaN ultraviolet avalanche photodiodes with p-type delta-doping," [Applied Physics Letters 92, 241103 \(2008\)](#).
 6. **C. Bayram**, J. L. Pau, R. McClintock, and M. Razeghi, "Delta-doping optimization for high quality p-type GaN," [Journal of Applied Physics 104, 083512 \(2008\)](#).

5. J. L. Pau, **C. Bayram**, R. McClintock, D. Silversmith, and M. Razeghi, “Back-illuminated separate absorption and multiplication GaN avalanche photodiodes” [Applied Physics Letters 92, 101120 \(2008\)](#).
4. J. L. Pau, R. McClintock, **C. Bayram**, K. Minder, D. Silversmith, and M. Razeghi, “High Optical Response in Forward Biased (In,Ga)N-GaN Multiquantum Well Diodes under Barrier Illumination,” [IEEE Journal of Quantum Electronics 44, 346 \(2008\)](#).
3. K. Minder, J. L. Pau, R. McClintock, P. Kung, **C. Bayram**, M. Razeghi, and D. Silversmith, “Scaling in GaN avalanche photodiodes designed for back-illumination,” [Applied Physics Letters 91, 073513 \(2007\)](#).
2. J. L. Pau, R. McClintock, K. Minder, **C. Bayram**, P. Kung, M. Razeghi, E. Munoz, and D. Silversmith, “Gieger-mode operation of back-illuminated GaN avalanche photodiodes,” [Applied Physics Letters 91, 041104 \(2007\)](#).
1. R. McClintock, J. L. Pau, K. Minder, **C. Bayram**, P. Kung, and M. Razeghi, “Hole-initiated multiplication in back-illuminated GaN avalanche photodiodes,” [Applied Physics Letters 90, 141112 \(2007\)](#).

Conference Papers:

17. **C. Bayram**, D. K. Sadana, Z. Vashaei, and M. Razeghi, “Reliable GaN-based resonant tunneling diodes with reproducible room-temperature negative differential resistance”, [Proc. SPIE 8268, 826827 \(2012\)](#).
16. Z. Vashaei, **C. Bayram**, R. McClintock, and M. Razeghi, “Effects of substrate quality and orientation on the characteristics of III-nitride resonant tunneling diodes”, [Proc. SPIE 7945, 79451A \(2011\)](#).
15. M. Razeghi, **C. Bayram**, Z. Vashaei, E. Cicek, and R. McClintock, “III-Nitride Optoelectronic Devices: From ultraviolet detectors and visible emitters towards terahertz intersubband devices”, [23rd Annual Meeting of the IEEE Photonics-Society Denver, CO, Nov. 07-11 \(2010\)](#).
14. R. McClintock, E. Cicek, Z. Vashaei, **C. Bayram**, M. Razeghi, and Melville P. Ulmer, “III-Nitride Based Avalanche Photo Detectors”, [Proc. SPIE 7780, 77801B \(2010\)](#).
13. E. Cicek, Z. Vashaei, **C. Bayram**, R. McClintock, and M. Razeghi, “Comparison of ultraviolet APDs grown on free-standing GaN and sapphire substrates”, [Proc. SPIE 7780, 77801P \(2010\)](#).
12. M. Razeghi, **C. Bayram**, R. McClintock, F.H. Teherani, D.J. Rogers, and V.E. Sandana, “Novel Green Light Emitting Diodes: Exploring Droop-free Lighting Solutions for a Sustainable Earth”, [Journal of Light Emitting Diodes 2 \(1\) 1-33 \(2010\)](#).
11. M. Razeghi and **C. Bayram**, “Material and design engineering of (Al)GaN for high-performance avalanche photodiodes and intersubband applications,” [Proc. SPIE 7366, 73661F \(2009\)](#).
10. **C. Bayram**, B. Fain, N. Péré-Laperne, R. McClintock, and M. Razeghi, “Pulsed metalorganic chemical vapor deposition of high quality AlN/GaN superlattices for intersubband transitions,” [Proc. SPIE 7222, 722212 \(2009\)](#).
9. R. McClintock, J. L. Pau Vizcaino, **C. Bayram**, B. Fain, P. Giedraitis, M. Razeghi, and M. P. Ulmer, “III-nitride avalanche photodiodes,” [Proc. SPIE 7222, 72220U \(2009\)](#).
8. **C. Bayram**, D. J. Rogers, F. Hosseini Teherani, and M. Razeghi, “Hybrid green LED based on nZnO/MQWInGaN/pGaN,” [Proc. SPIE 7217, 72170P \(2009\)](#).

7. J.L. Pau, **C. Bayram**, P. Giedraitis, R. McClintock, and M. Razeghi, "GaN-based nanostructured photodetectors," [Proc. SPIE 7222, 722214 \(2009\)](#).
6. R. McClintock, J. L. P. Vizcaino, K. Minder, **C. Bayram** and M. Razeghi, "III-nitride photon counting avalanche photodiodes," [Proc. SPIE 6900, 69000N \(2008\)](#).
5. K. Minder, F. H. Teherani, D. Rogers, **C. Bayram**, R. McClintock, P. Kung, and M. Razeghi, "Etching of ZnO towards the development of ZnO homostructure LEDs," [Proc. SPIE 6474, 64740Q \(2007\)](#).
4. P. Kung, R. McClintock, J. L. P. Vizcaino, K. Minder, **C. Bayram**, and M. Razeghi, "III-nitride avalanche photodiodes," [Proc. SPIE 6479, 64791J \(2007\)](#).
3. R. McClintock, K. Minder, A. Yasan, **C. Bayram**, F. Fuchs, P. Kung, and M. Razeghi, "Solar-blind avalanche photodiodes," [Proc. SPIE 6127, 61271D \(2006\)](#).
2. **C. Bayram**, S. Olcum, M. N. Senlik, and A. Atalar, "Bandwidth improvement in a cMUT array with mixed sized elements," [Proc. IEEE Ultrason. Symp., pp. 1956-1959. \(2005\)](#).
1. S. Olcum, M. N. Senlik, **C. Bayram** and A. Atalar, "Design charts to maximize the gain-bandwidth product of capacitive micromachined ultrasonic transducers," [Proc. IEEE Ultrason. Symp. Pp. 1941-1944. \(2005\)](#).

Oral Presentations:

Invited Presentations / Talks:

22. **C. Bayram**, "Applied Photonics for a Sustainable Earth: High Efficiency Light Emitting Diodes and Solar Cells," [TASSA Annual Conference](#), University of Maryland, College Park, MD, USA, March 3-4 (2012).
21. **C. Bayram**, D. K. Sadana, Z. Vashaei, and M. Razeghi, "Reliable GaN-based resonant tunneling diodes with reproducible room-temperature negative differential resistance," [SPIE Photonics West](#), San Francisco, CA, USA, January 22-27 (2012).
20. **C. Bayram** and M. Razeghi, "AlGaInN gap engineering from ultraviolet and visible wavelengths towards terahertz regime," [ICDD Spring Meetings](#), Pennsylvania, USA, March 17 (2011).
19. **C. Bayram** and M. Razeghi, "III-Nitride Optoelectronic Devices," [ICDD Spring Meetings](#), Pennsylvania, USA, March 15 (2011).
18. R. McClintock, E. Cicek, Z. Vashaei, **C. Bayram**, M. Razeghi, and Melville P. Ulmer, "III-Nitride Based Avalanche Photo Detectors," [SPIE Optics + Photonics](#), San Diego, USA, August 1-5 (2010).
17. M. Razeghi, **C. Bayram**, R. McClintock, F.H. Teherani, D.J. Rogers, and V.E. Sandana, "Novel Green Light Emitting Diodes: Exploring Droop-free Lighting Solutions for a Sustainable Earth", [LED 2010: The 4th International Conference on LED and Solid State Lighting](#), COEX (Seoul), Korea, Feb. 3-5 (2010).
16. **C. Bayram**, F. H. Teherani, D. Rogers, and M. Razeghi, "Novel Green Light Emitting Diodes", [Dow Chemical Company Sustainability Innovation Student Challenge Recognition Event](#), University of Michigan Ann Arbor, Oct. 19 (2009).
15. F. H. Teherani, **C. Bayram**, D. J. Rogers, M. Razeghi, and R. McClintock, "Hybrid Green LEDs with n-type ZnO Substituted for n-type GaN in an Inverted p-n Junction", [2009 Annual Meeting of IEEE Photonics Society](#), Antalya - Belek, Turkey, Oct. 4-8 (2009).
14. **C. Bayram** and M. Razeghi, "III-Nitride Optoelectronic Devices", [2009 Annual Meeting of IEEE Photonics Society](#), Antalya - Belek, Turkey, Oct. 4-8 (2009).

13. **C. Bayram**, F. H. Teherani, D. Rogers, R. McClintock, and M. Razeghi, "*Novel Green Light Emitting Diodes: Innovating Droop-free Lighting Solutions for Sustainable Earth*", 2009 symposium of the Chicago AIChE (American Institute of Chemical Engineers), Chicago, IL, Oct. 4-5 (2009).
12. M. Razeghi, **C. Bayram**, R. McClintock and N. Péré-Laperne, "*III-Nitride Optoelectronic Devices: High Performance GaN Avalanche Photodiodes, Novel Green Light Emitting Diodes and III-Nitride Intersubband Devices*", AFOSR Joint Electronics Program Review, Arlington, VA, May 27 (2009).
11. M. Razeghi, J. L. Pau, **C. Bayram**, B. Fain, P. Giedraitis, and R. McClintock, "*UV Single Photon Detection Based on III-Nitride Geiger Mode Avalanche Photodiodes*," 2nd International Symposium on Growth of III-Nitrides (ISGN-2). Laforet Shuzenji Izu, Japan -- July 6 (2008).
10. M. Razeghi, J. L. Pau, **C. Bayram**, R. McClintock, K. Kim, P. Giedraitis, and B. Fain, "*GaN Avalanche Photodiodes and Green Emitters*," 2008 AFRL-AFOSR Nanotechnology Initiative Review. Dayton, OH -- May 6 (2008).
9. R. McClintock, J. L. P. Vizcaino, K. Minder, **C. Bayram** and M. Razeghi, "*III-nitride photon counting avalanche photodiodes*," SPIE Photonics West, San Francisco, CA, USA, January 20-25, (2008).
8. K. Minder, F. H. Teherani, D. Rogers, **C. Bayram**, R. McClintock, P. Kung, and M. Razeghi, "*Etching of ZnO towards the development of ZnO homostructure LEDs*," SPIE Photonics West, San Francisco, CA, USA, January 20-25, (2008).

Conference Presentations:

7. Z. Vashaei, **C. Bayram**, R. McClintock, and M. Razeghi, "*Effects of substrate quality and orientation on the characteristics of III-nitride resonant tunneling diodes*", SPIE Photonics West, San Francisco, CA, USA, January 22-27 (2011).
6. R. McClintock, E. Cicek, Z. Vashaei, **C. Bayram**, M. Razeghi, and Melville P. Ulmer, "*III-Nitride Based Avalanche Photo Detectors*", SPIE Optics + Photonics, San Diego, California, USA, August 1-5 (2010).
5. E. Cicek, Z. Vashaei, **C. Bayram**, R. McClintock, and M. Razeghi, "*Comparison of ultraviolet APDs grown on free-standing GaN and sapphire substrates*", SPIE Optics + Photonics, San Diego, California, USA, August 1-5 (2010).
4. M. Razeghi, Z. Vashaei, and **C. Bayram**, "*High quality metal-organic chemical vapor deposition of (Al)GaN-based resonant tunneling diodes*," 3rd International Symposium on Growth of III-Nitrides (ISGN-3) Corum - Montpellier, France -- July 4-8, 2010.
3. M. Razeghi, **C. Bayram**, and Z. Vashaei, "*III-Nitride intersubband absorption devices and resonant tunneling diodes*," 3rd International Symposium on Growth of III-Nitrides (ISGN-3) Corum - Montpellier, France -- July 4-8, 2010.
2. V. E. Sandana, D. J. Rogers, F. H. Teherani, R. McClintock, **C. Bayram** M. Razeghi, H.-J. Drouhin, V. Sallet, G. Garry, F. Falyouni, "*Comparison of ZnO Nanostructures Grown Using PLD, MOCVD & PVT*," Proc. of the 5th Int. Workshop on ZnO and Related Materials, Sept. 22-24, Michigan (2008).
1. **C. Bayram**, D. J. Rogers, F. Hosseini Teherani, and M. Razeghi, "*Novel Hybrid Green LEDs Based on Substituting n-type ZnO for n-type GaN in an Inverted p-n Junction*," Proc. of the 5th International Workshop on ZnO and Related Materials, Sept. 22-24, Michigan (2008).