

Jonathan J. Wierer, Jr., Ph.D.



Jonathan Wierer is an Associate Professor at Lehigh University in the Department of Electrical and Computer Engineering and Center for Photonics and Nanoelectronics. His research interests include semiconductor device physics and semiconductor materials science. Specifically, he has made seminal contributions in III-nitride electronic and optoelectronic devices. His career and research experience are unique, in that it has been performed at very different organizations (university, industry, and a national laboratory), and has exposed him to different perspectives on semiconductor device research. This research has resulted in both a lengthy patent portfolio and highly reference journal articles.

Jonathan received his M.S., B.S., and Ph.D. from the University of Illinois at Urbana-Champaign in electrical engineering in 1994, 1995, and 1999, respectively. His Ph.D. advisor was Nick Holonyak, Jr., and his thesis work was to investigate tunnel junctions in InGaAs light emitters. This was the first-time tunnel junctions were used in LEDs and laser diodes, and this enabled efficient rerouting of currents and the removal of absorptive p-type layers. This method now enables vertical-cavity surface-emitting lasers emitting in the near infrared and it is also being explored for III-nitride ultraviolet and visible LEDs.

After his doctorate he joined Hewlett-Packard (later Lumileds Lighting) researching novel III-nitride light-emitting diodes (LEDs). He worked with the team that produced the world's first high-power (1 Watt) III-nitride flip-chip LEDs (FCLEDs). These illumination grade LEDs were drastically different from indicator LEDs and are arguably the light sources that began solid-state lighting (SSL). Jonathan was a key contributor in the research and development of FCLEDs and he led them into successful manufacturing. Today most high-power LEDs are some variation of the original FCLED.

Later at Lumileds he joined the Advanced Laboratories pursuing high risk and long-term LED research. There he primarily investigated high radiance and high extraction efficiency LEDs that employ photonic crystals. His seminal papers on photonic crystal LEDs demonstrated the ability to control emission patterns, showed their usefulness in etendue limited lighting systems, and determined the limits of extraction efficiency. Some of his most cited work is his photonic crystal LED research.

In 2008 he joined Sandia National Laboratories, and his interests broadened to include III-nitride research on laser diodes (LDs) for SSL, solar cells, intersubband devices, power electronic devices, and ultraviolet-emitting LEDs. Most notable, is his ground-breaking work on proposing LDs as an ultra-efficient light source for SSL. His key insight is that LDs can circumvent the decrease in efficiency that occurs in III-nitride LEDs (efficiency droop). LDs operate under stimulated emission after threshold, and efficiency dependent parasitic processes such as Auger recombination are clamped. This work began larger research efforts into this area by other researchers and companies, and still continues.

At Lehigh University he is continuing his research on semiconductor device physics and materials with specific efforts on light-emitters for SSL and displays. He is investigating quantum dot active layers as a method to overcome Auger recombination to create higher efficiency LEDs and laser diodes, and also researching more efficient green-red InGaN LEDs using interlayer quantum well designs. Another area Jonathan is pursuing is novel wide bandgap power electronic devices with III-nitride semiconductors. This work includes investigating novel edge termination schemes and wider bandgap III-nitride semiconductors such as AlGaN and AlInN.

Dr. Wierer has authored or co-authored over 150 journal publications and conference presentations, and holds 39 patents, predominately related to III-nitride devices. He is an associate editor for IEEE Photonics Technology Letters. He is a senior member of the Institute of Electrical and Electronics Engineers, and member of Optical Society of America, Illumination Engineering Society, and the International Society for Optics and Photonics.

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Contact Information

Associate Professor
Lehigh University
Center for Photonics and Nanoelectronics
Department of Electrical and Computer Engineering
P. C. Rossin College of Engineering and Applied Sciences

Sinclair Laboratory
7 Asa Drive
Bethlehem, PA 18015
(610) 758-2602

Email: jwierer@lehigh.edu

Web: <http://jwierer.com/>

ECE Web: <http://www.ee.lehigh.edu/index.php?page=wierer>

CPN Web: <http://www.lehigh.edu/~incpn/people/faculty/wierer.html>



Academic Degrees

- Ph.D. Electrical Engineering University of Illinois, Champaign Urbana, IL 1995-99
- Advisor: Nick Holonyak, Jr.
 - Thesis Title: Tunnel contact junction AlGaAs-GaAs-InGaAs quantum well heterostructure lasers and light emitters with native-oxide-defined lateral currents
 - Gregory Stillman Semiconductor Research Award (1998).
- M.S. Electrical Engineering University of Illinois, Champaign Urbana, IL 1994-95
- Advisor: Paul D. Coleman
 - Thesis Title: Current Overview of the Far IR p-Ge Laser
- B.S. Electrical Engineering University of Illinois, Champaign Urbana, IL 1990-94
- Honors

Professional Experience

- July 2015-present Associate Professor
Lehigh University, Bethlehem, PA
P. C. Rossin College of Engineering and Applied Sciences
Electrical and Computer Engineering
Center for Photonics and Nanoelectronics
- Oct 2008-June 2015 Principle Member of Technical Staff
Sandia National Laboratories, Albuquerque, NM
Semiconductor Materials and Device Sciences

March 2013-June 2013	Acting Manager (concurrent with Technical Staff status) Sandia National Laboratories, Albuquerque, NM Semiconductor Materials and Device Sciences Department
Jan 2004-Sept 2008	Senior Scientist Lumileds Lighting/Philips Lumileds Lighting, San Jose, CA Advanced Laboratories
Nov 2000-Jan 2004	Staff Scientist Lumileds Lighting, San Jose, CA Advanced Laboratories
2000 Fall Semester	Instructor (concurrent with Lumileds) San Jose State University, San Jose, CA Department of Chemical and Materials Engineering
May 1999-Nov 2000	Research and Development Engineer Lumileds Lighting/Agilent/Hewlett Packard, San Jose, CA III-V Materials Development
Jan 1999-May 1999	Hardware Design Engineer Hewlett Packard, San Jose, CA Fiber Optics Division
June 1995-Jan 1999	Graduate Research Assistant University of Illinois, Champaign-Urbana, IL Solid State Devices Laboratory (advisor: N. Holonyak, Jr.)
June 1994-June 1995	Graduate Research Assistant University of Illinois, Champaign-Urbana, IL Electrophysics Laboratory (advisor: P. D. Coleman)
June 1993-June 1994	Undergraduate Research Assistant University of Illinois, Champaign-Urbana, IL Electrophysics Laboratory (advisor: P. D. Coleman)

Publication Statistics

- Published Refereed Publications: 58 (2 under review)
- Conference Presentations: 100, Invited: 23
- US Patents: 39
- Book Chapters: 3
- Conference Proceedings: 7
- News Items: 30
- Google Scholar: <http://scholar.google.com/citations?hl=en&user=mnUvAGMAAAAJ>
 - Citations: 6547, h-index: 39, i10-index: 70
- ResearcherID/Web of Knowledge: <http://www.researcherid.com/rid/G-1594-2013>
 - Citations: 3006, h-index: 23, Ave Citations Per Article: 49.28

- Mendeley: <https://www.mendeley.com/profiles/jonathan-wierer/>
 - Citations: 3283, h-index 23
- ORCID: <https://orcid.org/0000-0001-6971-4835>

Publications

1. M. R. Peart, and J. J. Wierer, Jr., "Edge Termination for Power Devices using Polarization Engineering", submitted (2019).
2. S. A. A. Mueeed, W. Sun, M. R. Peart, R. M. Lentz, X. Wei, D. Borovac, R. Song, N. Tansu, and J. J. Wierer, Jr., "Direct measurement of reduced nonradiative recombination in InGaN-based multiple quantum wells emitting at 540-560 nm with AlGaN interlayers", submitted (2019).
3. X. Wei, S. A. A. Mueeed, M. Peart, W. Sun, N. Tansu, and J. J. Wierer, Jr., "Room Temperature Luminescence of InGaN Quantum Dots Formed by Quantum-Sized-Controlled Photoelectrochemical Etching", Appl. Phys. Lett., 113, 121106 (2018). DOI: [10.1063/1.5046857](https://doi.org/10.1063/1.5046857)
4. M. R. Peart, N. Tansu, and J. J. Wierer, Jr., "AlInN for Vertical Power Electronic Devices", IEEE Trans. Elec. Devices, 65, 4276-4281 (2018). DOI: [10.1109/TED.2018.2866980](https://doi.org/10.1109/TED.2018.2866980)
5. W. Sun, S. A. A. Mueeed, R. Song, J. J. Wierer, Jr., and N. Tansu "Integrating AlInN Interlayers into InGaN/GaN Multiple Quantum Wells for Enhanced Green Emission", Appl. Phys. Lett. 112, 201106 (2018). DOI: [10.1063/1.5028257](https://doi.org/10.1063/1.5028257)
6. W. Sun, C.-K. Tan, J. J. Wierer, Jr., and N. Tansu "Ultra-Broadband Optical Gain in III-Nitride Digital Alloys", Scientific Reports, 8, 3109 (2018). DOI: [10.1038/s41598-018-21434-6](https://doi.org/10.1038/s41598-018-21434-6)
7. S. A. A. Mueeed, W. Sun, X. Wei, R. Song, D. D. Koleske, N. Tansu, and J. J. Wierer, Jr., "Strain compensation in InGaN-based multiple quantum wells using AlGaN interlayers", AIP Advances 7, 105312 (2017). DOI: [10.1063/1.5000519](https://doi.org/10.1063/1.5000519)
8. J. J. Wierer, Jr., J. R. Dickerson, A. A. Allerman, A. M. Armstrong, M. H. Crawford, and R. J. Kaplar, "Simulations of junction termination extensions in vertical GaN power diodes", IEEE Trans. Elec. Devices, 64, 2291 (2017). DOI: [10.1109/TED.2017.2684093](https://doi.org/10.1109/TED.2017.2684093)
9. C.-K. Tan, W. Sun, J. J. Wierer, Jr., and N. Tansu, "Effect of Interface Roughness on Auger Recombination in Semiconductor Quantum Wells", AIP Advances, 7, 035212 (2017). DOI: [10.1063/1.4978777](https://doi.org/10.1063/1.4978777)
10. A. A. Allerman, A. M. Armstrong, A. J. Fischer, J. R. Dickerson, M. H. Crawford, M. P. King, M. W. Moseley, J. J. Wierer, Jr., and R. J. Kaplar, "Al_{0.3}Ga_{0.7}N PN diode with breakdown voltage greater than 1600 V", Elec. Letters, 52, 1319 (2016). DOI: [10.1049/el.2016.1280](https://doi.org/10.1049/el.2016.1280)
11. J. J. Wierer, Jr., N. Tansu, A. J. Fischer, and J. Y. Tsao, "III-nitride quantum dots for ultra-efficient solid-state lighting", Laser and Photonics Reviews, 10, 612-622 (2016). DOI: [10.1002/lpor.201500332](https://doi.org/10.1002/lpor.201500332), Altmetric: [1](https://www.altmetric.com/details/1)
12. A. M. Armstrong, A. A. Allerman, A. J. Fischer, M. P. King, M. S. van Heukelom, M. W. Moseley, R. J. Kaplar, J. J. Wierer, M. H. Crawford, and J. R. Dickerson, "High voltage and high current density vertical GaN power diodes", Elec. Letters, 52, 1170 (2016). DOI: [10.1049/el.2016.1156](https://doi.org/10.1049/el.2016.1156)
13. J. R. Dickerson, A. A. Allerman, B. N. Bryant, A. J. Fischer, Michael P. King, M. W. Moseley, A. M. Armstrong, R. J. Kaplar, I. C. Kizilyalli, O. Aktas, and J. J. Wierer, Jr., "Vertical GaN Power

- Diodes with a Bilayer Edge Termination”, IEEE Trans. Elec. Devices, 63, 419 (2016). DOI: [10.1109/TED.2015.2502186](https://doi.org/10.1109/TED.2015.2502186)
14. M. P. King, A. M. Armstrong, J. R. Dickerson, G. Vizkelethy, R. M. Fleming, J. Campbell, I. C. Kizilyalli, D. P. Bour, O. Atkas, D. Disney, J. J. Wierer, Jr., A. A. Allerman, M. W. Moseley, F. Leonard, A. A. Talin, and R. J. Kaplar “Performance and Breakdown Characteristics of Irradiated Vertical Power GaN P-i-N Diodes”, IEEE Trans on Nuclear Science, 62, 2912 (2015). DOI: [10.1109/TNS.2015.2480071](https://doi.org/10.1109/TNS.2015.2480071)
 15. J. J. Wierer, Jr., A. A. Allerman, E. J. Skogen, A. Tauke-Pedretti, G. A. Vawter, and I. Montano, “Selective layer disordering in intersubband Al_{0.028}Ga_{0.972}N/AlN superlattices with silicon nitride capping layer” Applied Physics Express, 8, 061004 (2015). DOI: [10.7567/APEX.8.061004](https://doi.org/10.7567/APEX.8.061004)
 16. A. M. Armstrong, M Moseley, A. A. Allerman, M. H. Crawford, and J. J. Wierer Jr., “Growth temperature dependence of Si doping efficiency and compensating deep level defect incorporation in Al_{0.7}Ga_{0.3}N” J. Appl. Phys. 117, 185704 (2015). DOI: [10.1063/1.4920926](https://doi.org/10.1063/1.4920926)
 17. A. M. Armstrong, B. N. Bryant, M. H. Crawford, D. D. Koleske, S. R. Lee, and J. J. Wierer Jr., “Defect-reduction mechanism for improving radiative efficiency in InGaN/GaN light-emitting diodes using InGaN underlayers” J. Appl. Phys. 117, 134501 (2015). DOI: [10.1063/1.4916727](https://doi.org/10.1063/1.4916727)
 18. M. W. Moseley, A. A. Allerman, M. H. Crawford, J. J. Wierer Jr., M. L. Smith and A. A. Armstrong, “Detection and modeling of leakage current in AlGaIn-based deep ultraviolet light-emitting diodes” J. Appl. Phys. 117, 095301 (2015). DOI: [10.1063/1.4908543](https://doi.org/10.1063/1.4908543), Altmetric: [1](#)
 19. M. Moseley, A. Allerman, M. Crawford, J. J. Wierer Jr., M. Smith, and L Biedermann, “Defect-Enabled Electrical Current Leakage in Ultraviolet Light-Emitting Diodes,” physica status solidi (a), 212 (4), 723-726 (2015). DOI: [10.1002/pssa.201570422](https://doi.org/10.1002/pssa.201570422)
 20. D. D. Koleske, A. J. Fischer, B. N. Bryant, P. G. Kotula, and J. J. Wierer, Jr., “On the increased efficiency in InGaIn-based multiple quantum wells emitting at 530–590nm with AlGaIn interlayers” J. Crystal Growth, 415, 57, (2015). DOI: [10.1016/j.jcrysgro.2014.12.034](https://doi.org/10.1016/j.jcrysgro.2014.12.034)
 21. J. J. Wierer, Jr. and J. Y. Tsao, “Advantages of laser diodes in solid-state lighting” physica status solidi (a), 5, 980 (2015). DOI: [10.1002/pssa.201431700](https://doi.org/10.1002/pssa.201431700)
 22. J. J. Wierer, Jr., A. A. Allerman, E. J. Skogen, A. Tauke-Pedretti, C. Alford, G. A. Vawter, and I. Montano, “Layer disordering and doping compensation of an intersubband AlGaIn/AlN superlattice by silicon implantation”, Appl. Phys. Lett., 105, 131107 (2014). DOI: [10.1063/1.4896783](https://doi.org/10.1063/1.4896783)
 23. J. J. Wierer, Jr., I. Montano, M. Mosely, and A. A. Allerman, “Influence of optical polarization on the improvement of light extraction efficiency with reflective scattering structures in ultra-violet light-emitting diodes,” Appl. Phys. Lett. 105, 061106 (2014). DOI: [10.1063/1.4892974](https://doi.org/10.1063/1.4892974)
 24. M. Mosely, A. A. Allerman, M. Crawford, J. J. Wierer, Jr., M. Smith, and L. Biedermann, “Electrical current leakage and open-core threading dislocations in AlGaIn-based deep ultraviolet light-emitting diodes”, J. Applied Physics, 116, 053104 (2014). DOI: [10.1063/1.4891830](https://doi.org/10.1063/1.4891830)
 25. J. Y. Tsao, M. H. Crawford, M. E. Coltrin, A. J. Fischer, D. D. Koleske, G. Subramania, G. T. Wang, J. J. Wierer, and B. Karlicek, “Toward Smart and Ultra-Efficient Solid-State Lighting”, Adv. Opt. Mat., 2, 803 (2014). DOI: [10.1002/adom.201400131](https://doi.org/10.1002/adom.201400131), Altmetric: [20](#)

26. J. J. Wierer, Jr., I. Montano, M. H. Crawford, and A. A. Allerman, “Effect of thickness and carrier density on the optical polarization of $\text{Al}_{0.44}\text{Ga}_{0.56}\text{N}/\text{Al}_{0.55}\text{Ga}_{0.45}\text{N}$ quantum well layers,” *J. Appl. Phys.* 115, 174501 (2014). DOI:[10.1063/1.4874739](https://doi.org/10.1063/1.4874739)
27. A. Benz, S. Campione, M. W. Moseley, J. J. Wierer, Jr., A. A. Allerman, J. R. Wendt, I. Brener, “Optical strong coupling between near-infrared metamaterials and intersubband transitions in III-nitride heterostructures,” *ACS Photonics*, 1, 906, (2014). DOI:[10.1021/ph500192v](https://doi.org/10.1021/ph500192v), [Altmetric:2](#)
28. M E. Coltrin, A. M. Armstrong, I. Brener, W. W. Chow, M. H. Crawford, A. J. Fischer, D. F. Kelley, D. D. Koleske, Q. Li, L. J. Lauhon, J. E. Martin, M. Nyman, E. F. Schubert, L. E. Shea-Rohwer, G. Subramania, J. Y. Tsao, G. T. Wang, J. J. Wierer, Jr., and J. B. Wright, “The Energy Frontier Research Center for Solid-State Lighting Science: Exploring New Materials Architectures and Light Emission Phenomena”, *J. Phys. Chem. C*, 118, 13330 (2014). DOI:[10.1021/jp501136j](https://doi.org/10.1021/jp501136j), [Altmetric: 4](#)
29. D. D. Koleske, J. J. Wierer, Jr., A. J. Fischer, and S. R. Lee, “Controlling indium incorporation in InGaN barriers with dilute hydrogen flows”, *J. Crystal Growth*, 390, 38 (2014). DOI:[10.1016/j.jcrysgro.2013.12.037](https://doi.org/10.1016/j.jcrysgro.2013.12.037)
30. G. T. Wang, Q. Li, J. J. Wierer, D. D. Koleske, and J. J. Figiel, “Top-down fabrication and characterization of axial and radial III-nitride nanowire LEDs”, *physica status solidi (a)*, 211, 748 (2014). DOI:[10.1002/pssa.201300491](https://doi.org/10.1002/pssa.201300491)
31. J. J. Wierer, Jr., D. S. Sizov, J. Y. Tsao, “The potential of III-nitride laser diodes for solid-state lighting”, *physica status solidi (c)*, 11, 674 (2014). DOI: [10.1002/pssc.201300422](https://doi.org/10.1002/pssc.201300422)
32. J. J. Wierer, Jr., D. S. Sizov, and J. Y. Tsao, “Comparison between Blue Laser and Light-Emitting Diodes for Future Solid-State Lighting”, *Lasers and Photonics Reviews*, 7, 963 (2013). (Cited 174) DOI:[10.1002/lpor.201300048](https://doi.org/10.1002/lpor.201300048), [Altmetric: 24](#)
33. J. R. Riley, S. Padalkar, Q. Li, P. Lu, J. J. Wierer, Jr., D. D. Koleske, G. T. Wang, and L. J. Lauhon, “Three-Dimensional Mapping of Quantum Wells in a GaN/InGaN Core-Shell Nanowire Array Light Emitting Diode”, *Nano Letters*, 13, 4317 (2013). DOI:[10.1021/nl4021045](https://doi.org/10.1021/nl4021045)
34. S. Howell, S. Padalkar, K. Yoon, Q. Li, J. J. Wierer, Jr., D. D. Koleske, G. Wang, and Lincoln J. Lauhon, “Spatial Mapping of Efficiency of GaN/InGaN Nanowire Array Solar Cells using Scanning Photocurrent Microscopy”, *Nano Letters* 13, 5123, (2013). DOI:[10.1021/nl402331u](https://doi.org/10.1021/nl402331u), [Altmetric: 3](#)
35. S. R. Lee, D. D. Koleske, M. H. Crawford, and J. J. Wierer, Jr., “Effect of interface grading and lateral thickness variations on x-ray diffraction by InGaN-GaN multiple quantum wells” *J. Crystal Growth*, 355, 63 (2012). DOI:[10.1016/j.jcrysgro.2012.06.048](https://doi.org/10.1016/j.jcrysgro.2012.06.048)
36. T. Kim, Y. H. Jung, J. Song, D. Kim, Y. Li, H.-S. Kim, I.-S. Song, J. J. Wierer, H. A. Pao, Y. Huang and J. A. Rogers, “Light-Emitting Diodes: High-Efficiency, Microscale GaN Light-Emitting Diodes and Their Thermal Properties on Unusual Substrates” *Small*, 8, 1643 (2012). DOI:[10.1002/sml.201200382](https://doi.org/10.1002/sml.201200382), [Altmetric: 3](#)
37. J. J. Wierer, Jr., Q. Li, D. D. Koleske, S. R. Lee, and G. T. Wang, “III-nitride core-shell nanowire arrayed solar cells”, *Nanotechnology*, 23 194007 (2012). (Cited 97) DOI:[10.1088/0957-4484/23/19/194007](https://doi.org/10.1088/0957-4484/23/19/194007)

38. J. J. Wierer, Jr., D. D. Koleske, and S. R. Lee, “Influence of barrier thickness on the performance of InGaN/GaN multiple quantum well solar cells” Appl. Phys. Lett., 100, 111119 (2012). DOI:[10.1063/1.3695170](https://doi.org/10.1063/1.3695170)
39. A. Neumann, J. J. Wierer, Jr., W. Davis, Y. Ohno, S. R. J. Brueck, and J. Y. Tsao, “Four-color laser white illuminant demonstrating high color rendering quality”, Optics Express, 19, A982 (2011). (Cited 115) DOI:[10.1364/OE.19.00A982](https://doi.org/10.1364/OE.19.00A982)
40. J. J. Wierer, Jr., A. A. Allerman, and Q. Li, “Silicon impurity-induced layer disordering of AlGaIn/AlN superlattices”, Appl. Phys. Lett., 97, 051907 (2010). DOI: [10.1063/1.3478002](https://doi.org/10.1063/1.3478002)
41. J. J. Wierer, Jr., A. J. Fischer, and D. D. Koleske, “The impact of piezoelectric polarization and nonradiative recombination on the performance of (0001) face GaN/InGaIn photovoltaic devices,” Appl. Phys. Lett. 96, 051107 (2010). (Cited 91) DOI:[10.1063/1.3301262](https://doi.org/10.1063/1.3301262)
42. J. J. Wierer, Jr., A. David, M. M. Megens, “III-nitride photonic crystal light-emitting diodes with high extraction efficiency,” Nature Photonics, 3, 1 (2009). (Cited 585) DOI:[10.1038/nphoton.2009.21](https://doi.org/10.1038/nphoton.2009.21), Altmetric: [3](https://www.altmetric.com/details/3)
43. N. F. Gardner, J. C. Kim, J. J. Wierer, M. R. Krames, and Y-C. Shen “Polarization Anisotropy in the Electroluminescence of m-plane InGaIn Light-Emitting Diodes,” Appl. Phys. Lett. 86, 111101 (2005). DOI:[10.1063/1.1875765](https://doi.org/10.1063/1.1875765), Altmetric: [3](https://www.altmetric.com/details/3)
44. J. J. Wierer, M. R. Krames, J. E. Epler, N. F. Gardner, M. G. Craford, J. R. Wendt, J. A. Simmons, M. M. Sigalas, “InGaIn/GaN Quantum-Well Heterostructure Light-Emitting Diodes Employing Photonic Crystal Structures,” Appl. Phys. Lett. 84, pp. 3885 (2004). (Cited 441) DOI:[10.1063/1.1738934](https://doi.org/10.1063/1.1738934), Altmetric: [6](https://www.altmetric.com/details/6)
45. Y-C. Shen, J. J. Wierer, M. R. Krames, M. J. Ludowise, M. S. Misra, F. Ahmed, A. Y. Kim, G. O. Mueller, J. C. Bhat, S. A. Stockman, P. S. Martin, “Optical cavity effects in InGaIn/GaN Quantum-Well-Heterostructure Flip-Chip Light-Emitting Diodes,” Appl. Phys. Lett. 82, pp. 2221 (2003). DOI:[10.1063/1.1566098](https://doi.org/10.1063/1.1566098)
46. F. M. Stranka, J. Bhat, D. Collins, L. Cook, M. G. Craford, R. Fletcher, N. Gardner, P. Grillot, W. Goetz, M. Keuper, R. Khare, A. Kim, M. Krames, G. Harbers, M. Ludowise, P. S. Martin, M. Misra, G. Mueller, R. Mueller-Mach, S. Rudaz, Y.-C. Shen, D. Steigerwald, S. Stockman, S. Subramanya, T. Trottier, and J. J. Wierer, “High Power LEDs – Technology Status and Market Applications”, phys. Stat. Sol. (a), Volume 194, Issue 2, (2002). DOI:[10.1002/1521-396X](https://doi.org/10.1002/1521-396X), Altmetric: [6](https://www.altmetric.com/details/6)
47. M. R. Krames, J. Bhat, D. Collins, N. F. Gardner, W. Götz, C. H. Lowery, M. Ludowise, P. S. Martin, G. Mueller, R. Mueller-Mach, S. Rudaz, D.A. Steigerwald, S. A. Stockman, and J. J. Wierer, “High Power III-Nitride Emitters for Solid State Lighting,” phys. stat. sol. (a), Volume 192, Issue 2, (2002). DOI:[10.1002/1521-396X](https://doi.org/10.1002/1521-396X), Altmetric: [6](https://www.altmetric.com/details/6)
48. A. Y. Kim, W. Götz, D.A. Steigerwald, J. J. Wierer, N. F. Gardner, J. Sun, S. A. Stockman, P. S. Martin, M. R. Krames, R. S. Kern, F. M. Stranka, “Performance of High-Power AlInGaIn Light Emitting Diodes,” phys. Stat. Sol. (a), 188, 15 (2001). DOI: [10.1002/1521-396X](https://doi.org/10.1002/1521-396X)
49. J. J. Wierer, D. A. Steigerwald, M. R. Krames, J. J. O’Shea, M. J. Ludowise, G. Christenson, Y.-C. Shen, C. Lowery, P. S. Martin, S. Subramanya, W. Götz, N. F. Gardner, R. S. Kern, S. A. Stockman “High-Power AlGaInN Flip-Chip Light-Emitting Diodes,” Appl. Phys. Lett. 78, pp. 3379 (2001). (Cited 631) DOI: [10.1063/1.1374499](https://doi.org/10.1063/1.1374499)

50. J. J. Wierer, "Tunnel Contact Junction AlGaAs-GaAs-InGaAs Quantum Well Heterostructure Lasers and Light Emitters with Native-Oxide Defined Lateral Currents," PhD Thesis, University of Illinois, May 1999. URI: <http://hdl.handle.net/2142/81288>
51. J. J. Wierer, D. A. Kellogg, and N. Holonyak, Jr., "Tunnel Contact Junction Native-Oxide Aperture Vertical-Cavity Surface-Emitting Lasers and Resonant-Cavity Light-Emitting Diodes," Appl. Phys. Lett. 74, 926 (1999). (Cited 59) DOI:[10.1063/1.123452](https://doi.org/10.1063/1.123452), Altmetric: [3](#)
52. P. W. Evans, J. J. Wierer, and N. Holonyak, Jr., "AlGaAs Native-Oxide-Based Distributed Bragg Reflectors for Vertical-Cavity Surface-Emitting Lasers," J. Appl. Phys. 84, 5436 (1999). DOI:[10.1063/1.368857](https://doi.org/10.1063/1.368857), Altmetric: [3](#)
53. J. J. Wierer, P. W. Evans, N. Holonyak, Jr., and D. A. Kellogg, "Vertical Cavity Surface Emitting Lasers Utilizing Native Oxide Mirrors and Buried Contact Junctions," Appl. Phys. Lett. 72, 2743 (1998). DOI:[10.1063/1.121445](https://doi.org/10.1063/1.121445)
54. J. J. Wierer, P. W. Evans, and N. Holonyak, Jr., "Transition from Edge to Vertical Cavity Operation of Tunnel Contact AlGaAs-GaAs-InGaAs Quantum Well Heterostructure Lasers," Appl. Phys. Lett. 74, 797 (1998). DOI:[10.1063/1.120869](https://doi.org/10.1063/1.120869)
55. J. J. Wierer, P. W. Evans, N. Holonyak, Jr., and D. A. Kellogg, "Lateral Electron Current Operation of Vertical-Cavity Surface-Emitting Lasers with Buried Tunnel Contact Hole Sources," Appl. Phys. Lett. 71, 3468-3470 (1997). DOI:[10.1063/1.120400](https://doi.org/10.1063/1.120400), Altmetric: [3](#)
56. J. J. Wierer, P. W. Evans, and N. Holonyak, Jr., "Buried Tunnel Contact Junction AlGaAs-GaAs-InGaAs Quantum Well Heterostructure Lasers with Oxide-Defined Lateral Currents," Appl. Phys. Lett. 71, 2286-2288 (1997). DOI: [10.1063/1.120071](https://doi.org/10.1063/1.120071), Altmetric: [3](#)
57. P. W. Evans, J. J. Wierer, and N. Holonyak, Jr., "Photopumped Laser Operation of an Oxide Post GaAs-AlAs Superlattice Photonic Lattice," Appl. Phys. Lett., 70, 1119-1120 (1997). DOI:[10.1063/1.118480](https://doi.org/10.1063/1.118480)
58. J. J. Wierer, S. A. Maranowski, N. Holonyak, Jr., P. W. Evans, and E. I. Chen, "Double Injection and Negative Resistance in Stripe Geometry Oxide Aperture $\text{Al}_y\text{Ga}_{1-y}\text{As-GaAs-In}_x\text{Ga}_{1-x}\text{As}$ Quantum Well Heterostructure Laser Diodes," Appl. Phys. Lett., 69, 2882-2884 (1996). DOI:[10.1063/1.117350](https://doi.org/10.1063/1.117350)
59. J. J. Wierer, "Current Overview of the Far IR p-Ge Laser", Masters Thesis, University of Illinois, May 1995.
60. P. D. Coleman and J. J. Wierer, "Establishment of a Dynamic Model for the p-Ge Far IR Laser," International Journal of Infrared and Millimeter Waves 16, 3 (1995). DOI:[10.1007/BF02085845](https://doi.org/10.1007/BF02085845)

Conference Presentations

1. S. A. A. Mueeed, W. Sun, X. Wei, R. B. Song, N. Tansu, and J. J. Wierer, Jr., "Improvement in the radiative efficiency of InGaN-based multiple quantum wells using AlGaN interlayers", SPIE Photonics West (February 2019) San Francisco, CA.
2. J. J. Wierer, Jr., "Green and red InGaN emitters for monolithic white light and displays", EERE Solid-State Lighting Conference (January 2019) Dallas, TX. (invited panel).
3. M. Peart, N. Tansu, and J. J. Wierer, Jr., "AlInN for Vertical Power Electronic Devices", International Workshop on Nitride Semiconductors 2018 (November 2108) Kanazawa, Japan.

4. X. Wei, S. A. A. Muyeed, M. Peart, N. Tansu, and J. J. Wierer, Jr., “Controlled Synthesis of InGaN Quantum Dots for Efficient Light Emitters”, IEEE Photonics Conference 2018, (October 2018) Reston, VA.
5. S. A. A. Muyeed, W. Sun, X. Wei, R. B. Song, D. Koleske, N. Tansu, and J. J. Wierer, Jr., “Improvement in the radiative efficiency of InGaN-based multiple quantum wells using AlGaIn interlayers”, IEEE Photonics Conference 2018, (October 2018) Reston, VA.
6. M. Peart, N. Tansu, and J. J. Wierer, Jr., “AlInN for Vertical Power Electronic Devices”, Les Eastman Conference 2018 (August 2108), Columbus, OH.
7. R. Lentz, M. Peart, S. A. A. Muyeed, and J. J. Wierer, Jr. “Differential Carrier Lifetime Measurements of InGaN Light-Emitting Diodes”, David and Lorraine Freed Undergraduate Research Symposium, Lehigh University (April 2018) Bethlehem, PA. (Award: Honorable Mention).
8. T. Farinha, O. Ogidi-Ekoko, J. C. Goodrich, J. J. Wierer, Jr., N. Tansu, N. Strandwitz, “Epitaxial MgO Films Grown on GaN by Atomic Layer Deposition: Growth Temperature Dependence and Thermal Stability” David and Lorraine Freed Undergraduate Research Symposium, Lehigh University (April 2018) Bethlehem, PA. (Award: Winner)
9. N. Tansu, J. J. Wierer, Jr., I. Fragkos, D. Borovac, A. M. Slosberg, and C. K. Tan, “Next Generation III-Nitride Materials and Devices – from Photonics to New Applications”, Proc. of the International Symposium on Advanced Plasma Science and its Application for Nitrides and Nanomaterials 2018 (March 2018) Nagoya, Japan (Invited).
10. S. A. Al Muyeed, W. Sun, X. Wei, R. Song, N. Tansu, and J. J. Wierer, Jr., "Strain compensation in InGaN-based multiple quantum wells with AlGaIn interlayers", SPIE Photonics West (February 2018) San Francisco, CA.
11. N. Tansu, J. J. Wierer, Jr., C. K. Tan, and W. Sun "Next Generation III-Nitride Materials and Devices - from Photonics to New Applications", Proc. of the OSA Solid State Lighting (SSL) Topical Meeting 2017 (November 2017) Boulder, CO. (invited).
12. J. J. Wierer, Jr. Xiongliang Wei, and Syed Ahmed Al Muyeed, Wei, Sun, Nelson Tansu, J. Tsao, D. Koleske, M.-C. Tsai, R. P. Schneider, “Pathways to ultra-efficient solid-state lighting”, IEEE Photonics Conference (October 2017), Orlando FL (invited).
13. J. J. Wierer, Jr., Xiongliang Wei, Syed Ahmed Al Muyeed, Wei Sun, Nelson Tansu, J. Tsao, and D. Koleske “Routes to ultra-efficient III-nitride emitters for solid-state lighting” 11th International Symposium on Semiconductor Light Emitting Devices (October, 2017) Banff, Canada (invited).
14. N. Tansu, J. J. Wierer, Jr., C. K. Tan, and W. Sun, “Next Generation III-Nitride Materials and Devices - From Photonics to New Applications”, SPIE Optics+Photonics, (August 2017), San Diego, CA (invited).
15. N. Tansu, J. J. Wierer, Jr., C. K. Tan, and W. Sun, “Next Generation III-Nitride Materials and Research-From Photonics to New Applications”, CLEO Pacific Rim, (August 2017), Singapore (invited).
16. W. Sun, R. Song, J. J. Wierer Jr., and N. Tansu, “Strain relaxation properties of OMVPE-grown AlInN semiconductors” AACGE (August 2017) Santa Fe, NM.

17. I. Fragkos, W. Sun, D. Borvac, R. Song, [J. Wierer Jr.](#), and N. Tansu, "Pulsed OMVPE growth studies of InN integration of InGaN active regions" AACGE (August 2017) Santa Fe, NM.
18. S. A. Al Mueeed, W. Sun, X. Wei, R. Song, N. Tansu, and [J. J. Wierer, Jr.](#), "Strain balancing in InGaN-based multiple quantum wells using AlGaN interlayers", 59th Electronic Materials Conference (June 2017), South Bend, IN.
19. [J. J. Wierer, Jr.](#), Xiongliang Wei, and Nelson Tansu, "III-nitride quantum dots for ultra-efficient LEDs", SPIE Photonics West (January, 2017) San Francisco, CA (invited).
20. N. Tansu, and [J. J. Wierer, Jr.](#), "Next Generation III-Nitride Materials and Devices," SPIE Photonics West, Gallium Nitride Materials and Devices XI, (February 2017) San Francisco, CA. (invited)
21. W. Sun, C.-K. Tan, [J. J. Wierer Jr.](#), and N. Tansu, "Ultra-broadband III-nitride digital alloys active region for optoelectronic applications", SPIE Photonics West (February 2017) San Francisco, CA.
22. A. A. Allerman, M. H. Crawford, A. G. Baca, A. Armstrong, J.R. Dickerson, M. King, A. J. Fischer, and [J. J. Wierer Jr.](#), "Power electronic devices based on Al-rich AlGaN alloys", SPIE Photonics West (February 2017) San Francisco, CA.
23. C.-K. Tan, W. Sun, [J. J. Wierer Jr.](#), and N. Tansu, "How the interface affects Auger process in quantum wells", SPIE Photonics West (February 2017) San Francisco, CA.
24. C. K. Tan, W. Sun, D. Borovac, [J. J. Wierer, Jr.](#), and N. Tansu, "Dilute-Anion Nitride Semiconductors", Proc. of the IEEE Photonics Conference 2016, (October 2016) Waikoloa, Hawaii.
25. [J. J. Wierer, Jr.](#), N. Tansu, and J. Y. Tsao, "Ultra-efficient solid-state lighting using III-nitride quantum dots" International Workshop on Nitride Semiconductors 2016 (October, 2016) Orlando, FL.
26. [J. J. Wierer Jr.](#), and N. Tansu, "Research areas for ultra-efficient solid-state lighting", EERE-SSL Roundtable, (September 2016), Washington D. C.
27. W. Sun, C.-K. Tan, [J. J. Wierer, Jr.](#), and N. Tansu, "Miniband Engineering in III-Nitride Digital Alloy for Broadband Device Applications", Lester Eastman Conference, (August 2016) Bethlehem, PA.
28. C.-K. Tan, W. Sun, D. Borovac, [J. J. Wierer, Jr.](#), and N. Tansu, "Band Gap Engineering in GaN-Based Semiconductor with Dilute-Anion Incorporation for Visible Light Emitters", Lester Eastman Conference, (August 2016) Bethlehem, PA.
29. [J. J. Wierer, Jr.](#), N. Tansu, and J. Y. Tsao, "Achieving ultra-efficiency in III-nitride LEDs and laser diodes for solid-state lighting", OSA Integrated Photonics Research, Silicon and Nano Photonics Integrated Photonics Research, Silicon, and Nano-Photonics, (July 2016) Vancouver, B.C, Canada (invited).
30. I. Montano, A. A. Allerman, [J. J. Wierer](#), M. Moseley, E. J. Skogen. A. Tauke-Padretti, and G. A. Vawter, "Microscopic Modeling of Nitride Intersubband Absorbance," American Physical Society Meeting, (March 2016) Baltimore, MD.

31. N. Tansu, and J. J. Wierer, Jr., "Next Generation III-Nitride Materials and Devices," Proc. of the SPIE Photonics West 2016, Gallium Nitride Materials and Devices XI, (February 2016) San Francisco, CA. (invited)
32. C.-K. Tan, W. Sun, D. Borovac, J. J. Wierer, Jr., and N. Tansu, "InGaN-GaNAs 'Interface Quantum Well' for Long Wavelength Emission", DOE SSL Workshop, (February 2016) Raleigh, NC. (invited, student award winner)
33. J. J. Wierer, Jr. "Edge termination in vertical GaN diodes/Opportunity for GaN substrates in SSL", Roadmapping for GaN Workshop, (January 2016) Davis, CA.
34. N. Tansu, C. K. Tan, and J. J. Wierer, Jr., "Tutorial on III-nitride solid-state lighting and smart lighting", IEEE Photonics Conference, (October 2015), Washington D. C.
35. A. A. Allerman, M. W. Moseley, M. H. Crawford, J. J. Wierer, A. M. Armstrong, A. G. Baca, R. J. Kaplar, and B. G. Clark, "Low Dislocation Density AlGaIn Epilayers for UV Laser Diodes and Devices for Power Electronics," 228th ECS Meeting (October 2015), Phoenix, AZ.
36. R. J. Kaplar, A. A. Allerman, A. M. Armstrong, A. G. Baca, A. J. Fischer, J. J. Wierer, and J. C. Neely, "Ultra-Wide-Bandgap Semiconductors for Power Electronics," 228th ECS Meeting (October 2015), Phoenix, AZ.
37. J. J. Wierer, Jr. and N. Tansu, "Breakthrough research leading to ultra-efficient solid-state lighting", EERE-SSL Roundtable, (September 2015), Washington D. C.
38. M. W. Moseley, A. A. Allerman, I. Montano, J. J. Wierer, A. Tauke-Pedretti, E. Skogen and G. A. Vawter, "Strain-Mediated Interfacial Diffusion and Shifts in Intersubband Transition Energies in AlN/AlGaIn Superlattices", ACCGE (August 2015), Big Sky, MT.
39. M. H. Crawford, A. A. Allerman, A. M. Armstrong, J. J. Wierer, W. Chow, M. Moseley, M. W. Smith, and K. C. Cross, "350-nm band edge-emitting laser diodes enabled by low-dislocation-density AlGaIn templates", IEEE Summer Topical Meeting (July 2015), Nassau, Bahamas.
40. J. R. Dickerson, J. J. Wierer, M. P. King, B. Bryant, A. J. Fischer, A. A. Allerman and R. J. Kaplar, "A Numerical Analysis of Multiple Field Ring Designs for High Power GaN Diodes", 57th Electronic Materials Conference (June 2015), Columbus, Ohio.
41. M. P. King, R. J. Kaplar, J. J. Wierer, M. W. Moseley, I. C. Kizilyalli, D. P. Bour, O. Aktas, H. Nie, D. Disney, A. A. Allerman, and A. M. Armstrong, "Investigation of Deep Levels in High-Breakdown-Voltage, Low-Threading-Dislocation-Density Vertical GaN P-i-N Diode", 57th Electronic Materials Conference (June 2015), Columbus, Ohio.
42. Montano, A. A. Allerman, J. J. Wierer, M. W. Moseley, E. J. Skogen, A. Tauke-Pedretti and G. A. Vawter, "Microscopic Modeling of Nitride Intersubband Absorbance", 57th Electronic Materials Conference (June 2015), Columbus, Ohio.
43. M. W. Moseley, A. A. Allerman, I. Montano, J. J. Wierer, A. Tauke-Pedretti, E. Skogen and G. A. Vawter, "Strain-Mediated Interfacial Diffusion and Shifts in Intersubband Transition Energies in AlN/AlGaIn Superlattices", 57th Electronic Materials Conference (June 2015), Columbus, Ohio.
44. J. J. Wierer, Jr., and J. Y. Tsao, "Prospects for laser diodes in solid-state lighting", International Conference on Light-Emitting Devices and Their Industrial Applications -LEDIA (April 2015), Yokohama, Japan. (invited)

45. J. J. Wierer, Jr., and J. Y. Tsao, “Laser diodes in solid-state lighting”, CS International (March 2015), Frankfurt, Germany. (Keynote)
46. J. J. Wierer, Jr., I. Montano, M. H. Crawford, M. Moseley, and A. A. Allerman, “Effect of Thickness and Carrier Density on the Optical Polarization and Extraction Efficiency of 275nm Ultraviolet Light Emitting Diodes”, International Workshop on Nitride Semiconductors (August 2014), Wroclaw, Poland.
47. A. A. Allerman, M. Moseley, J. J. Wierer, Jr., A. Armstrong, and, M. H. Crawford, “Impact of electrically-conducting defects on UVC-LED performance”, International Workshop on Nitride Semiconductors (August 2014), Wroclaw, Poland.
48. J. J. Wierer, Jr., and J. Y. Tsao, “Solid-state lighting with III-nitride laser diodes”, International Workshop on Nitride Semiconductors (August 2014), Wroclaw, Poland.
49. G. T. Wang, Q. Li, J. B. Wright, H. Xu, J. J. Wierer, Jr., D. D. Koleske, J. J. Figiel, A. Hurtado, L. F. Lester, C. Li, S. R. J. Brueck, T. S. Luk, and I. Brener, “Top-down III-nitride nanowires: from LEDs to lasers”, SPIE Optics and Photonics (August 2014), San Diego, CA.
50. J. J. Wierer, Jr., and J. Y. Tsao, “Laser diodes in solid-state lighting”, SPIE Optics and Photonics (August 2014), San Diego, CA. (invited)
51. J. J. Wierer, Jr., “Research trends and future directions for solid-state lighting”, IES Regional Conference, (July 2014), Albuquerque NM. (invited)
52. A. M. Armstrong, M. W. Moseley, A. A. Allerman, M. H. Crawford, J. J. Wierer, “Strong Sensitivity of Si Doping Efficiency and Deep Level Formation on Growth Temperature” for n-type $\text{Al}_{0.7}\text{Ga}_{0.3}\text{N}$, Electronic Materials Conference, (June 2014), Santa Barbara, CA.
53. G. T. Wang, Q. Li, J. B. Wright, H. Xu, J. J. Wierer, D. D. Koleske, J. J. Figiel, A. Hurtado, L. F. Lester, G. Subramania, T. S. Luk, I. Brener, “Top-Down III-Nitride Nanowire LEDs and Lasers”, 56th Electronic Materials Conference, (June 2014), Santa Barbara, CA.
54. J. J. Wierer, Jr., I. Montano, M. H. Crawford, and A. A. Allerman, “Anisotropic optical polarization of AlGa_N based 275 nm light-emitting diodes due to quantum-size effects,” CLEO, (June 2014), San Jose, CA.
55. A. A. Allerman, A. A., J. J. Wierer, I. Montano, M. W. Moseley, E. J. Skogen, A. Tauke-Pedretti, G. A. Vawter, “MOVPE Grown Electromodulators based on Intersubband Absorption Utilizing AlN-AlGa_N Coupled Quantum Wells”, 5th International Symposium on Growth of III-Nitrides, (May 2014), Atlanta, GA.
56. M. Moseley, A. A. Allerman, M. H. Crawford, J. J. Wierer, M. L. Smith, L. Biedermann, “Electrical Current Leakage and the Performance of UV-C LEDs”, 5th International Symposium on Growth of III-Nitrides, (May 2014), Atlanta, GA.
57. J. J. Wierer, A. J. Fischer, G. T. Wang, J. Y. Tsao, and B. Biefeld, “Laser Diodes for Solid-State Lighting”, EERE SSL Workshop PI Meeting, (January 2014), Tampa, FL (invited).
58. J. Riley, S. Padalkar, Q. Li, P. Lu, D. Koleske, J. J. Wierer, G. Wang, L. Lauhon, “Revealing the 3-D Structure of Nanowire LEDs”, 2014 DOE Solid-State Lighting R&D Workshop, (January 2014), Tampa, FL.

59. S. Howell, S. Padalkar, K. Yoon, Q. Li, D. D. Koleske, J. J. Wierer, G. T. Wang, L. J. Lauhon, "Spatial Mapping of Efficiency of GaN/InGaN Nanowire Array Solar Cells by using Scanning Photocurrent Microscopy", Fall MRS Meeting, (December 2013), Boston, MA.
60. J. J. Wierer, Jr., D. S. Sizov, A. Neumann, S. R. J. Brueck, and J.Y. Tsao," The potential III-nitride laser diodes as a future solid-state lighting source", IEEE Photonics Conference, (September 2013), Bellevue, WA. (invited)
61. J. J. Wierer, Jr., D. S. Sizov, A. Neumann, S. R. J. Brueck, and J.Y. Tsao," The potential III-nitride laser diodes for solid-state lighting", International Conference on Nitride Semiconductors, (August 2013), Washington, D. C.
62. J. J. Wierer, Jr., D. S. Sizov, and J.Y. Tsao," III-nitride laser diodes for solid-state lighting", Energy Frontier Research Centers Principal Investigators, (July 2013), Washington D.C.
63. J. J. Wierer, Jr., D. S. Sizov, A. Neumann, S. R. J. Brueck, and J.Y. Tsao," Study of III-nitride laser diodes for solid-state lighting", CLEO, (June 2013), San Jose, CA.
64. J. J. Wierer, Jr., D. Koleske, G. Wang, Q. Li, S. Lee, and A. Fischer, "III-nitride solar cells", Asia Photonics Conference, (November 2012), Guangzhou, China. (invited)
65. A. A. Allerman, J. J. Wierer, Q. Li, M. H. Crawford, and S. R. Lee, "Impurity-Induced Disorder in Si- and Mg-Doped AlGa_N-AlN Superlattices" Meeting of the Electrochemical Society (October 2012) Honolulu HI.
66. G. T. Wang, Q. Li, J. J. Wierer, D. D. Koleske, J. J. Figiel, J. B. Wright, T. S. Luk, and I. Brener, "III-nitride nanowires: From the Bottom-Up to the Top-Down" SPIE Optics and Photonics Conference (August 2012), San Diego, CA.
67. G. T. Wang, Q. Li, J. J. Wierer, D. D. Koleske, J. J. Figiel, J. B. Wright, T. S. Luk, and I. Brener, "III-nitride nanowires: Novel Materials for Lighting and Photovoltaics" Photonics North (June 2012), Montreal, Canada.
68. A. A. Allerman, J. J. Wierer, Q. Li, S. R. Lee, and M. H. Crawford, "MOVPE Growth of Intersubband Absorption in AlN-AlGa_N Superlattices, "16th MOVPE Conference, (May 2012), Seoul, South Korea.
69. Q. Li, G. T. Wang, J. B. Wright, I. Brener, T. S. Luk, M. H. Crawford, G. S. Subramania, D. D. Koleske, J. J. Wierer, S. R. Lee, "Top-Down III-nitride nanowires" Electronic Materials Conference (June 2012), Santa Barbara, CA.
70. J. J. Wierer, Jr., G. T. Wang, Q. Li, D. D. Koleske, and S. R. Lee, "III-nitride nanowire array solar cells" CLEO, (May 2012), San Jose, CA. (postdeadline talk)
71. G. T. Wang, Q. Li, J. J. Wierer, D. D. Koleske, J. J. Figiel, "Fabrication and characterization of vertically-integrated, III-nitride nanowire based LEDs and solar cells", Spring Meeting of the Materials Research Society (March 2012), San Francisco, CA.
72. G. T. Wang, Q. Li., J. J. Wierer, J. J. Figiel, J. B. Wright, T. S. Luk, and I. Brener, "Top-Down Fabrication of GaN-based nanorod LEDs and lasers" SPIE Photonics West, (January 2012), San Francisco, CA.
73. J. J. Wierer, Jr. "Lasers and Nanowire Architectures for SSL" EERE-SSL Roundtable, (November 2011), Washington D. C.

74. A. A. Allerman, M. H. Crawford, S. R. Lee, K. C. Cross, M. A. Miller, [J. J. Wierer](#), and B. Clark, “Low Dislocation Density $\text{Al}_x\text{Ga}_{1-x}\text{N}$ Alloys $x < 0.3$) on Overgrowth of Patterned Templates” 9th Int. Conf. of Nitride Semiconductors” (July 2011), Glasgow, U. K.
75. Q. Li, G. T. Wang, J. B. Wright, I. Brener, T. S. Luk, M. H. Crawford, G. S. Subramania, D. D. Koleske, [J. J. Wierer](#), S. R. Lee, “Internal Quantum Efficiency in Nanorod LED Arrays Created by Top-Down Techniques” 53rd Electronic Materials Conference (June 2011), Santa Barbara, CA.
76. A. A. Allerman, M. H. Crawford, S. R. Lee, K. C. Cross, M. A. Miller, [J. J. Wierer](#), and B. Clark, “Low Dislocation Density $\text{Al}_{0.32}\text{Ga}_{0.68}\text{N}$ by Overgrowth of Patterned Templates” 53rd Electronic Materials Conference (June 2011), Santa Barbara, CA.
77. [J. J. Wierer, Jr.](#), “Light Extraction Methods in Light-Emitting Diodes”, CLEO, (May, 2011), Baltimore, MD (invited tutorial).
78. J. Y. Tsao, Jeffrey Y., M. E. Coltrin, M. H. Crawford, [J. J. Wierer](#), and J. A. Simmons, “Four Challenges for Solid-State Lighting”, DOE EERE SSL Workshop, (February 2011) San Diego, CA.
79. [J. J. Wierer, Jr.](#), D. D. Koleske, A. J. Fischer, S. R. Lee, G. N. Nielson, M. Okandan, “InGaN-based Photovoltaic Devices for High-Efficiency Mechanically-Stacked Multijunction Cell Structures”, International Workshop on Nitride Semiconductors (September 2010), Tampa, FL (invited).
80. A. A. Allerman, [J. J. Wierer](#), M. H. Crawford, Q. Li, S. R. Lee, “Impurity-Induced Disorder in Mg- and Si-doped AlGa_N-AlN Superlattices”, International Workshop on Nitride Semiconductors, (September 2010), Tampa, FL.
81. A. A. Allerman, [J. J. Wierer, Jr.](#), M. Crawford, Q. Li., “Influence of MOVPE Growth Conditions on Intersubband Absorption in AlN–AlGa_N Superlattices”, Electronic Materials Conference, (June 2010), South Bend, IN.
82. J. Y. Tsao, M. Crawford, Y. Ohno, J. Simmons, P. Waide, [J. J. Wierer, Jr.](#), “Solid-State Lighting: Science, Technology, Economic Perspective”, SPIE Photonics West, (26 Jan 2010), San Jose, CA.
83. [J. J. Wierer](#), “Light Extraction in III-Nitride Light-Emitting Diodes”, Lehigh University COT Open House, (October 2009) Bethlehem, PA (invited).
84. M. H. Crawford, D. D. Koleske, S. R. Lee, J. Y. Tsao, A. M. Armstrong, G. T. Wang, A. J. Fischer, [J. J. Wierer](#), M. E. Coltrin, and L. E. Shea-Rohwer, “Roadblocks to High Efficiency Solid-State Lighting: Bridging the ‘Green-Tellow Gap’” Photonic Applications Systems Technologies, Baltimore, MD (June 2009).
85. [J. J. Wierer](#), “Light Generation and Extraction in III-Nitride Light-Emitting Diodes”, Spring Meeting of the Materials Research Society, (April 2009) San Francisco, CA (Invited).
86. [J. J. Wierer](#) and A. David, “Directional Emission III-Nitride Photonic Crystal LEDs” International Conference on Nitride Semiconductors, (September 2007) Las Vegas, NV.
87. N. Gardner, [J. J. Wierer](#), J. Kim, M. R. Krames, “Linearly polarized spontaneous electroluminescence from m-plane InGa_N/Ga_N multiple-quantum-well light-emitting diodes”, International Conference on Nitride Semiconductors (August 2005), Bremen, Germany.

88. N. Gardner, J. Kim, [J. J. Wierer](#), Y. C. Shen, M. R. Krames, “Linearly polarized spontaneous emission from *m*-plane InGaN/GaN multiple-quantum-well LEDs”, SPIE Photonics West (January 2005), San Jose, CA.
89. [J. J. Wierer](#), “High-power III-Nitride LEDs and Photonic Crystal LEDs,” Light–Matter Coupling Conference-PLMCN5 (June 2005), Edinburgh, U. K., (invited).
90. [J. J. Wierer](#), “High-power III-Nitride LEDs and Photonic Crystal LEDs,” Univ. of IL, MNTL/CNST Nanotechnology workshop (May 2005), Champaign, IL (invited).
91. [J. J. Wierer](#), M. R. Krames, J. E. Epler, N. F. Gardner, J. R. Wendt, and, M. M. Sigalas, “III-Nitride LEDs with Photonic Crystal Structures,” SPIE Photonics West, (January 2005), San Jose, CA.
92. Y. C. Shen, [J. J. Wierer](#), M. R. Krames, M. J. Ludowise, M. S. Misra, F. Ahmed, A. Y. Kim, G. O. Mueller, J. C. Bhat, S. A. Stockman, and P. S. Martin, “Optical Cavity Effects in InGaN/GaN Quantum-Well-Heterostructure Flip-Chip Light-Emitting Diodes”, SPIE Photonics West (January 2004) San Jose, CA.
93. N. F. Gardner, J. Bhat, D. Collins, L. Cook, M. G. Craford, R. M. Fletcher, P. Grillot, W. K. Goetz, M. Kueper, R. Khare, A. Kim, M. R. Krames, G. Harbers, M. Ludowise, P. S. Martin, M. Misra, G. Mueller, R. Mueller-Mach, S. Rudaz, Y.-C. Shen, D. Steigerwald, S. A. Stockman, S. Subramanya, T. Trottier, [J. J. Wierer](#), “High-flux and high-efficiency nitride-based light emitting devices”, IEEE Lasers and Electro Optics Society Conference (November 2002) Glasgow Scotland (invited)
94. F. M. Steranka, J. Bhat, D. Collins, L. Cook, M. G. Craford, R. Fletcher, N. Gardner, P. Grillot, R. Fletcher, W. Goetz, M. Keuper, R. Khare, A. Kim, M. Krames, G. Harbers, M. Keuper, R. Khare, A. Kim,, M. Ludowise, P.S. Martin, M. Misra, G. Mueller, R. Mueller-Mach, S. Rudaz, Y.-C. Shen, D. Steigerwald, S. Stockman, D. Steigerwald, S. Subramanya, T. Trottier, and [J. J. Wierer](#), “High High-Power Power LEDs LEDs - Technology Status and Market Applications” International Workshop on Nitride Semiconductors (July 2002) Aachen, Germany.
95. S. A. Stockman, W. Götz, L. Cook, M. Misra, A.Y. Kim, N.F. Gardner, [J.J. Wierer](#), D.A. Steigerwald, D. Collins, P.S. Martin, M.R. Krames, D. Sun, E. Johnson, and R.S. Kern, “High-Power GaN-based LEDs for Solid State Lighting”, SPIE Photonics West (January 2002), San Jose, CA.
96. D. A. Steigerwald, [J. J. Bhat](#), C.-H. Chen, W. Goetz, R. , C.-H. Chen, W. Goetz, R. Khare, A. Kim, M. R. Krames, M. Ludowise. P. S. Martin, S. Rudaz, S. Stockman, S. Subramanya S-C Tan, J. Thompson, and [J. J. Wierer](#), “High Power, High Efficiency InGaN Light Emitting Diodes”, SPIE Photonics West (January 2001), San Jose CA.
97. W. Goetz, F. Ahmed, [J. Bhat](#), L. Cook, N.F. Gardner, E. Johnson, M. Misra, R.S. Kern, A.Y. Kim, J. Kim, J. Kobayashi, M.R. Krames, M. Ludowise, P.S. Martin, T. Mihopoulos, A. Munkholm, S. Rudaz, S. Salim, Y-C. Chen, D.A. Steigerwald, S.A. Stockman, J. Sun, [J. J. Wierer](#), D. Vanderwater, F.M. Steranka, and M.G. Craford “Power III-Nitride LEDs”, International Conference on Nitride Semiconductors-ICNS-4, (July 2001) Denver, CO.
98. P. S. Martin, J. C. Bhat, C.-H. Chen, L. W. Cook, M. G. Craford, N. F. Gardner, W. Götz, R. S. Kern, R. Khare, A. Kim, M. R. Krames, M. J. Ludowise, R. Mann, M. Misra, J. O'Shea, Y.-C. Shen, F. M. Steranka, S. A. Stockman, S. Subramanya, S. L. Rudaz, D. A. Steigerwald, and [J. J.](#)

Wierer, “High-Power Red, Green, Blue and White LEDs” SPIE Photonics West (January 2001) San Jose, CA.

99. J. J. Wierer, J. C. Bhat, C.-H. Chen, G. Christenson, L.W. Cook, M. G. Craford, N. F. Gardner, W. K. Goetz, R. S. Kern, R. Khare, A. Kim, M. R. Krames, M. J. Ludowise, R. Mann, P. S. Martin, M. Misra, J. O'Shea, Y.-C. Shen, F. M. Steranka, S. A. Stockman, S. G. Subramanya, S. L. Rudaz, D. A. Steigerwald, J. Yu “High-Power AlGaInN Light-Emitting Diodes,” SPIE Photonics West, (January 2001) San Jose, CA.
100. M. R. Krames, G. Christenson, D. Collins, L. W. Cook, M. G. Craford, A. Edwards, R. M. Fletcher, N.F. Gardner, W. K. Goetz, W. R. Imler, E. Johnson, R. S. Kern, R. Khare, F.A. Kish, C. Lowery, M. J. Ludowise, R. Mann, M. Maranowski, S. A. Maranowski, P. S. Martin, J. O'Shea, S. L. Rudaz, D. A. Steigerwald, J. Thompson, J. J. Wierer, J. Yu, D. Basile, Y.-L. Chang, G. Hasnain, M. Heuschen, K. P. Killeen, C. P. Kocot, S. Lester, J. N. Miller, G. O. Mueller, R. Mueller-Mach, S. J. Rosner, R. P. Schneider, T. Takeuchi, and T. S. Tan “High Brightness AlGaInN Light-Emitting Diodes,” SPIE Photonics West (January 2000) San Jose, CA.

Patents and Pending Applications (US only)

1. J. J. Wierer, Jr., A. David, and H. Choy” SEMICONDUCTOR LIGHT EMITTING DEVICE WITH LIGHT EXTRACTION STRUCTURES”, [US Patent 10,164,155](#) (December 25, 2018)
2. J. J. Wierer, Jr. and J. E. Epler,” III-NITRIDE LIGHT EMITTING DEVICE INCLUDING POROUS SEMICONDUCTOR LAYER”, [US Patent 10,090,435](#) (October 2, 2018)
3. J. J. Wierer, Jr., A. David, and H. Choy,” SEMICONDUCTOR LIGHT EMITTING DEVICE WITH LIGHT EXTRACTION STRUCTURES”, [US Patent 9,935,242](#) (April 3, 2018)
4. J. R. Dickerson, J. J. Wierer, Jr., R. Kaplar, and A. A. Allerman, DIODE AND METHOD OF MAKING THE SAME, [US Patent 9917149](#) (March, 2018)
5. J. J. Wierer, Jr., A. J. Fischer, and A. A. Allerman, VERTICAL III-NITRIDE THIN-FILM POWER DIODE, [US Patent 959616](#) (March, 2017)
6. J. J. Wierer, Jr. and J. E. Epler, III-NITRIDE LIGHT EMITTING DEVICE INCLUDING A POROUS SEMICONDUCTOR, [US Patent 9385265](#) (July, 2016)
7. J. J. Wierer, Jr., and A. A. Allerman, SELECTIVE LAYER DISORDERING IN III-NITRIDES WITH A CAPPING LAYER, [US Patent 9368677](#) (June 14, 2016)
8. A. J. Fischer, J. Y. Tsao, J. J. Wierer, Jr., X. Xiaoyin, and G. T. Wang “QUANTUM-SIZE-CONTROLLED PHOTOELECTROCHEMICAL ETCHING OF SEMICONDUCTOR NANOSTRUCTURES”, [US Patent 9276382](#) (March 1, 2016)
9. J. J. Wierer, Jr., I. Montano, A. A. Allerman, “HIGH EXTRACTION EFFICIENCY ULTRAVIOLET LIGHT-EMITTING DIODE,” [US Patent 9196788](#) (Nov. 24, 2015)
10. A. David, H. Choy, and J. J. Wierer, Jr.,” SEMICONDUCTOR LIGHT EMITTING DEVICE WITH LIGHT EXTRACTION STRUCTURES”, [US Patent 9142726](#) (Sept. 22 2015)
11. J. J. Wierer Jr., M. R. Krames, and N. Gardner “GROWN PHOTONIC CRYSTALS IN SEMICONDUCTOR LIGHT EMITTING DEVICES”, [US Patent 9000450](#) (April 7, 2015)
12. J. J. Wierer, Jr., and A. A. Allerman, “IMPURITY INDUCED DISORDER IN III-NITRIDE MATERIALS AND DEVICES”, [US Patent 8895335](#) (Nov 25, 2014)

13. G. T. Wang, Q. Li, J. J. Wierer, Jr., and D. Koleske” AMBER LIGHT-EMITTING DIODE COMPRISING A GROUP III-NITRIDE NANOWIRE ACTIVE REGION”, [US Patent 8785905](#) (July 22, 2014)
14. A. David, H. Choy, and J. J. Wierer, Jr.,” SEMICONDUCTOR LIGHT EMITTING DEVICE WITH LIGHT EXTRACTION STRUCTURES”, [US Patent 8242521](#) (Aug 14, 2012)
15. J. J. Wierer Jr. and N. Gardner “GROWN PHOTONIC CRYSTALS IN SEMICONDUCTOR LIGHT EMITTING DEVICES”, [US Patent 8163575](#) (April 24, 2012)
16. A. David, H. Choy, and J. J. Wierer, Jr.,” SEMICONDUCTOR LIGHT EMITTING DEVICE WITH LIGHT EXTRACTION STRUCTURES”, [US Patent 7985979](#) (July 26, 2011)
17. J. J. Wierer Jr. and J. E. Epler,” III-NITRIDE LIGHT EMITTING DEVICE INCLUDING POROUS SEMICONDUCTOR LAYER”, [US Patent 7928448](#) (April 19, 2011)
18. J. J. Kim, J. Epler, N. Gardner, M. R. Krames, and J. J. Wierer Jr., “SEMICONDUCTOR LIGHT EMITTING DEVICES INCLUDING IN-PLANE LIGHT EMITTING LAYERS”, [US Patent 7808011](#) (Oct 5, 2010)
19. J. J. Wierer Jr., J. Epler, M. R. Krames, and M. G. Craford, “POLARIZATION-REVERSED LIGHT EMITTING DEVICE”, [US Patent 7804100](#) (Sept 28, 2010)
20. J. Epler, O. Shchekin, F. J. Wall, Jr., J. J. Wierer Jr., and L. Zhou, ”METHOD OF REMOVING THE GROWTH SUBSTRATE OF A SEMICONDUCTOR LIGHT EMITTING DEVICE”, [US Patent 7754507](#) (July 13, 2010)
21. J. J. Wierer Jr. and M. Sigalas, “LIGHT EMITTING DEVICE INCLUDING ARRAYED EMITTERS DEFINED BY A PHOTONIC CRYSTAL”, [US Patent 7697584](#) (April 13, 2010)
22. J. J. Wierer Jr., M. R. Krames, and J. E. Epler,” PHOTONIC CRYSTAL LIGHT EMITTING DEVICE”, [US Patent 7675084](#) (March 9, 2010)
23. M. R. Krames, J. J. Wierer Jr., and M. M. Sigalas, “LED INCLUDING PHOTONIC CRYSTAL STRUCTURE”, [US Patent 7642108](#) (Jan 5, 2010)
24. J. J. Wierer Jr., M. R. Krames, and J. E. Epler, “PHOTONIC CRYSTAL LIGHT EMITTING DEVICE”, [US Patent 7442965](#) (October 28, 2008)
25. J. J. Wierer Jr. and M. M. Sigalas, “PHOTONIC CRYSTAL LIGHT EMITTING DEVICE WITH MULTIPLE LATTICES”, [US Patent 7442964](#) (Oct 28, 2008)
26. J. J. Wierer Jr. , M. R. Krames, and M. M. Sigalas, “PHOTONIC CRYSTAL LIGHT EMITTING DEVICE”, [US Patent 7294862](#) (Nov 13, 2007)
27. M. R. Krames, M. M. Sigalas, and J. J. Wierer Jr., “LED INCLUDING PHOTONIC CRYSTAL STRUCTURE”, [US Patent 7279718](#) (Oct 9, 2007)
28. J. J. Wierer Jr., M. R. Krames, M. M. Sigalas “PHOTONIC CRYSTAL LIGHT EMITTING DEVICE”, [US Patent 7012279](#) (March 14, 2006)
29. J. C. Kim, N. F. Gardner, M. R. Krames, Y-C. Shen, T. A. Trottier, J. J. Wierer Jr., “HETEROSTRUCTURES FOR III-NITRIDE LIGHT EMITTING DEVICES”, [US Patent 6995389](#) (Feb 7, 2006)

30. J. J. Wierer Jr., M. R. Krames, and S. Rudaz, "MULTI-LAYER HIGHLY REFLECTIVE OHMIC CONTACTS FOR SEMICONDUCTOR DEVICES", [US Patent 6992334](#) (Jan 31, 2006)
31. J. E. Epler, M. R. Krames, and J. J. Wierer Jr., "RESONANT CAVITY III-NITRIDE LIGHT EMITTING DEVICES FABRICATED BY GROWTH SUBSTRATE REMOVAL" [US Patent 6956246](#) (Oct 18, 2005)
32. N. F. Gardner, J. J. Wierer Jr., G. O. Mueller, and M. K. Krames, "SEMICONDUCTOR LIGHT EMITTING DEVICES", [US Patent 6847057](#) (Jan 25, 2005)
33. M. R. Krames, D. A. Steigerwald, F. A. Kish, P. Rajkomar, J. J. Wierer Jr., and T. S. Tan, "III-NITRIDE LIGHT EMITTING DEVICE WITH INCREASED LIGHT GENERATING CAPABILITY" [US Patent 6844571](#) (Jan 18, 2005)
34. D. A. Steigerwald, S. D. Lester, and J. J. Wierer Jr., "HIGHLY REFLECTIVE CONTACTS TO III-NITRIDE FLIP-CHIP LEDs," [US Patent 6573537](#) (June 3, 2003)
35. M. R. Krames, D. A. Steigerwald, F. A. Kish, P. Rajkomar, J. J. Wierer Jr., and T. S. Tan, "III-NITRIDE LIGHT EMITTING DEVICE WITH INCREASED LIGHT GENERATING CAPABILITY" [US Patent 6521914](#) (Feb 18, 2003)
36. J. J. Wierer Jr., M. R. Krames, D. A. Steigerwald, F. A. Kish, P. Rajkomar, and T. S. Tan, "METHOD OF MAKING III-NITRIDE LIGHT EMITTING DEVICE WITH INCREASED LIGHT GENERATING CAPABILITY," [US Patent 6514782](#) (Feb 4, 2003)
37. M. R. Krames, D. A. Steigerwald, F. A. Kish, P. Rajkomar, J. J. Wierer Jr., and T. S. Tan, "III-NITRIDE LIGHT EMITTING DEVICE WITH INCREASED LIGHT GENERATING CAPABILITY" [US Patent 6486499](#) (Nov 26, 2002)
38. M. J. Ludowise, S. A. Maranowski, D. A. Steigerwald, J. J. Wierer, Jr., "METHOD OF FORMING CONTACTS TO A P-GAN LAYER," [US Patent 6287947](#) (Sept 11, 2001)
39. N. Holonyak, Jr., J. J. Wierer, and P. W. Evans, "SEMICONDUCTOR DEVICES AND METHODS WITH TUNNEL CONTACT HOLE SOURCES" [US Patent 5936266](#) (Aug 10, 1999)

Applications/Pending

40. F. Danesh, N. F. Gardner, and J. J. Wierer, Jr., LIGHT EMITTING DIODES WITH INTEGRATED REFLECTOR FOR A DIRECT VIEW DISPLAY AND METHOD OF MAKING THEREOF, US Application 20180198047
41. J. J. Wierer, Jr., J. Y. Tsao, and A. J. Fischer, WHITE LIGHT ILLUMINANT COMPRISING QUANTUM DOT LASERS AND PHOSPHORS, US Application 20160087406A1

Conference Proceedings

1. G. T. Wang, Q. Li, J. Wierer, J. Figiel, J. B. Wright, T. S. Luk, and I. Brener, "Top-down fabrication of GaN-based nanorod LEDs and lasers" Proceedings of SPIE Vol. 5941, 59410J (2011). DOI: [10.1117/12.909377](#)
2. G. T. Wang, Q. Li, J. Huang, J. Wierer, A. Armstrong, Y. Lin, P. Upadhy, R. Prasankumar, "III-Nitride nanowires: Emerging Materials for Lighting and Energy Applications" ECS Transactions, 35, 3 (2011). DOI: [10.1149/1.3570840](#)

3. N. F. Gardner, J. C. Kim, **J. J. Wierer**, Y.-C. Shen, M. R. Krames, "Linearly polarized spontaneous emission from m-plane InGaN/GaN multiple-quantum-well LEDs", Proceedings of SPIE Vol. 5941, 59410J (2005).
4. **J. J. Wierer**, M. R. Krames, J. Epler, N. F. Gardner, J. R. Wendt, M. M. Sigalas, S. R. J. Brueck, D. Li, M. Y. Shagam, "III-nitride LEDs with photonic crystal structures", Proceedings of SPIE Vol. 5739, (2005).
5. Y.-C. Shen, **J. J. Wierer**, M. R. Krames, M. J. Ludowise, M. Misra, F. Ahmed, A. Y. Kim, G. O. Mueller, J. C Bhat, S. A. Stockman, P. S. Martin, "Optical cavity effects in InGaN/GaN quantum-well-heterostructure flip-chip light-emitting diodes", Proceedings of SPIE Vol. 5366, (2004).
6. **J. J. Wierer**, J.C Bhat, C.-Hua Chen, G. Christenson, L. W. Cook, M. G. Craford, N. F. Gardner, W. K. Goetz, R. S. Kern, R. Khare, A. Y. Kim, M. R. Krames, M. J. Ludowise, R. Mann, P. S. Martin, M. Misra, J. J. O'Shea, Y.-C. Shen, F. M. Steranka, S. A. Stockman, S. G. Subramanya, S. L. Rudaz, D. A. Steigerwald, J. Yu, "High-power AlInGaN light-emitting diodes", Proceedings of SPIE Vol. 4278, (2001).
7. M. R. Krames, G. Christenson, D. Collins, L.W. Cook, M. George Craford, A. D. Edwards, R. M. Fletcher, N. F. Gardner, W. K. Goetz, W. R. Imler, E. Johnson, R. Scott Kern, R. Khare, F. Kish, C. Lowery, M. J. Ludowise, R. Mann, M. Maranowski, S. A. Maranowski, P. S. Martin, J. J. O'Shea, S. L. Rudaz, D. A. Steigerwald, J. Thompson, **J. J. Wierer**, J. Yu, D. Basile, Y.-L. Chang, G. Hasnain, M. Heuschen, K. P. Killeen, Chris P. Kocot, Steven D. Lester, Jeffrey N. Miller, Gerd O. Mueller, Regina Müller-Mach, S. J. Rosner, R. P. Schneider, T. Takeuchi, T. S. Tan, "High-brightness AlGaInN light-emitting diodes", Proceedings of SPIE Vol. 3938, (2000).

Book Chapters

1. J. Y. Tsao, **J. J. Wierer Jr.**, Lauren E.S. Rohwer, Michael E. Coltrin, Mary H. Crawford, Jerry A. Simmons, Po-Chieh Hung, Harry Saunders, Dmitry S. Sizov, Raj Bhat, and Chung-En Zah, "Ultra-efficient Solid-State Lighting: Likely Characteristics, Economic Benefits, Technological Approaches", *III-Nitride Based Light Emitting Diodes and Applications*, (Springer, 2017).
2. J. Y. Tsao, **J. J. Wierer Jr.**, Lauren E.S. Rohwer, Michael E. Coltrin, Mary H. Crawford, Jerry A. Simmons, Po-Chieh Hung, Harry Saunders, Dmitry S. Sizov, Raj Bhat, and Chung-En Zah, "Ultra-efficient Solid-State Lighting: Likely Characteristics, Economic Benefits, Technological Approaches", *III-Nitride Based Light Emitting Diodes and Applications*, (Springer, 2013).
3. M.H. Crawford, J.Y. Tsao, **J. J. Wierer, Jr.**, M.E. Coltrin, and R.F. Karlicek, "Solid-State Lighting: Towards Smart and Ultra-Efficient Materials, Devices, Lamps and Systems", D.L. Andrews, Ed., *Photonics Volume 3: Photonics Technology and Instrumentation* (Wiley, 2013).

News Items

1. "Wierer receives the Joel and Ruth Spira Excellence in Teaching award", Lehigh ECE, Oct 2019. <http://www.ece.lehigh.edu/index.php?mact=News,cntnt01,detail,0&cntnt01articleid=63&cntnt01returnid=172>
2. "Aluminum indium nitride as interlayer for green-emitting multi-quantum wells", Semiconductor Today, June 7, 2018. http://www.semiconductor-today.com/news_items/2018/jun/lehigh_070618.shtml

3. “The Building of Innovation: Researchers needed tech that didn't exist; with NSF support, they are bringing it to life in Lehigh University's Center for Photonics and Nanoelectronics”, American Association for the Advancement of Science (AAAS), Feb 22, 2018.
https://www.eurekalert.org/pub_releases/2018-02/lu-tbo022218.php
4. “Lessons on Laser Diodes” Architectural Lighting Technology, Nov. 27, 2017.
http://www.archlighting.com/technology/lessons-on-laser-diodes_o
5. “Strong showing by Lehigh faculty, students at IEEE photonics conference”, Lehigh News, Oct 5, 2017.
<http://www.lehigh.edu/engineering/news/faculty/2017/20171005-IEEE-photonics-conference.html>
6. “OSA Members Host Photonics Faculty Tour for Congressman Charlie Dent”, The Optical Society, July 12, 2017.
http://www.osa.org/en-us/about_osa/newsroom/news_releases/2017/osa_members_host_photonics_facility_tour_for_congr/
7. “A Congressman Visits the CPN”, Lehigh News, July 7, 2017.
<https://www1.lehigh.edu/news/congressman-visits-cpn>
8. “Advancing the LED”, Lehigh News, Jan 30, 2017.
<http://www.lehigh.edu/engineering/news/faculty/2017/20170130-wierer-led-technology.html>
9. “Power/Performance Bits: Jan. 24”, Semiconductor Engineering, Jan 24, 2017.
<http://semiengineering.com/powerperformance-bits-jan-24/>
10. “Nanoscale Structures Lead to More Efficient Solid-State Lighting”, Resolve Magazine, Jan. 7 2017.
<http://www.lehigh.edu/engineering/research/resolve/2017v1/briefs-wierer-led-lighting.html>
11. “Sandia research could improve defense electronics, electric vehicles, grids”, Sandia News, Jan. 5, 2017.
<http://www.sandia.gov/news/publications/labnews/articles/2017/06-01/bandgap.html>
12. “Quantum Dots Could Lead to Ultra-Efficient Solid-State Lighting Sources”, AZOquantum, Jan 4, 2017.
<http://www.azoquantum.com/News.aspx?newsID=5147>
13. “Nanoscale Structures Lead to More Efficient Solid-State Lighting”, Lehigh News, Jan. 7, 2017.
<http://www1.lehigh.edu/news/nanoscale-structures-lead-more-efficient-solid-state-lighting>
14. “Lasers light the road ahead”, Compound Semiconductor, July 14, 2015.
<https://compoundsemiconductor.net/article/97529-lasers-light-the-road-ahead.html>
15. “Solid-state lighting: Are laser diodes the logical successors to LEDs?”, Compound Semiconductor, Dec. 18, 2013.
<https://compoundsemiconductor.net/article/91487-solid-state-lighting-are-laser-diodes-the-logical-successors-to-leds.html>
16. “Laser diodes versus LEDs”, Phys.org, Nov 11, 2013.
<http://phys.org/news/2013-11-laser-diodes.html>
17. “Pursuing pathways to widespread adoption of solid-state lighting”, Compound Semiconductor, Oct 28, 2013.

- https://compoundsemiconductor.net/article/91323/Pursuing_pathways_to_widespread_adoption_of_solid-state_lighting
18. “Sandia team demonstrates III-nitride nanowire array solar cells”, nanotechweb.org, Aug. 7, 2012. <http://nanotechweb.org/cws/article/lab/50455>
 19. “Sandia Researchers Develop High-Indium-Content Nanowire Solar Cell”, azonano.com, June 19, 2012. <http://www.azonano.com/news.aspx?newsID=25071>
 20. “Solar InGaN nanowire arrays assist energy conversion”, Compound Semiconductor, June 19, 2012. <https://compoundsemiconductor.net/article/89622-solar-ingan-nanowire-arrays-assist-energy-conversion.html>
 21. “Indium Upped in Nanowire Solar Cell”, Photonics.com, June 18, 2012. <http://photonics.com/Article.aspx?AID=51167>
 22. “Solar nanowire array may increase percentage of sun’s frequencies available for energy conversion”, Sandia Labs News Releases, June 18, 2012.
 23. “Sandia creates InGaN nanowires for wide-spectrum solar cells”, Laser Focus World, June 6, 2012. <http://www.laserfocusworld.com/articles/2012/06/sandia-creates-ingan-nanowires-for-wide-spectrum-solar-cells.html>
 24. “Diode lasers to battle it out with LEDs”, Compound Semiconductor, Nov. 7, 2011. <https://compoundsemiconductor.net/article/88699-diode-lasers-to-battle-it-out-with-leds.html>
 25. “Lasers could replace LEDs”, Lux Magazine, Nov. 3, 2011. <http://archive.luxmagazine.co.uk/2011/11/lasers-could-replace-leds/>
 26. “High-quality white light produced by four-color laser source; Diode lasers could challenge LEDs for home and industrial lighting supremacy”, ScienceDaily, Oct 27, 2011. <https://www.sciencedaily.com/releases/2011/10/111026143731.htm>
 27. “Diode lasers may vie with LEDs for lighting supremacy”, RDMag, Oct 2011. <http://www.rdmag.com/news/2011/10/diode-lasers-may-vie-leds-lighting-supremacy>
 28. “SOLID-STATE ILLUMINATION: Four-color laser source produces high-quality white light”, Laser Focus World, Aug. 1, 2011. <http://www.laserfocusworld.com/articles/print/volume-47/issue-8/world-news/solid-state-illumination-four-color-laser-source-produces-high-quality-white-light.html>
 29. “Lasers could offer alternative to LED light sources”, LEDs Magazine, 2011. <http://www.ledsmagazine.com/articles/2011/11/lasers-could-offer-alternative-to-led-light-sources.html>
 30. “Glitter-Sized Solar Photovoltaics Promise Improved Performance”, ECNmag, June 29, 2010. <http://www.ecnmag.com/news/2010/06/glitter-sized-solar-photovoltaics-promise-improved-performance>
 31. “LIGHT-EMITTING DIODES: Photonic-crystal LED has high extraction efficiency”, Laser Focus World, June 1, 2009.

<http://www.laserfocusworld.com/articles/print/volume-45/issue-6/world-news/light-emitting-diodes-photonic-crystal-led-has-high-extraction-efficiency.html>

32. “Photonic-crystal LED reaches 73% light-extraction efficiency”, LEDs Magazine, 2009.
<http://www.ledsmagazine.com/articles/2009/03/photonic-crystal-led-reaches-73-light-extraction-efficiency.html>

Honors/Awards

- Joel and Ruth Spira Excellence in Teaching Award / Lutron Electronics Co., 2018
- Honorary Member of Illumination Engineering Society (IES), 2014.
- R&D100 Award, “Photovoltaics that fit” (R&D Mag), 2012.
- Senior Member of Institute of Electrical and Electronics Engineers (IEEE), 2011.
- R&D100 Award, “Cantilever Epitaxy and Growth of Low-Dislocation Gallium Nitride” (R&D Mag), 2004.
- Gregory Stillman Semiconductor Research Award, 1998.

Societies

- IEEE: Senior Member 2011-present, Member 1998-2011.
- OSA: Member 2011-present.
- IES: Member 2014-present.
- SPIE: Member 2016-present

Conference Activities

- CLEO Conference, Subcommittee Member, S&I 15 LEDs, Photovoltaics, and Energy Efficient Photonics, 2012.
- CLEO Conference, Subcommittee Chair, S&I 15 LEDs, Photovoltaics, and Energy Efficient Photonics, 2013, 2014.
- Electronics Materials Conference, Organizer, Group III-Nitrides: Growth, Processing, Characterization, Theory and Devices, 2015-2018.
- International Workshop on Nitride Semiconductors, Proceedings Committee, 2016.
- Light-Emitting Diodes and their Industrial Applications (LEDIA) , Program Committee, 2016-2018.
- Lester Eastman Conference, Program Committee, 2016, 2018.
- International Workshop of Nitride Semiconductors (IWN), Program Committee Optical Devices, 2018.

Journal Activities

- Associate Editor, IEEE Photonics Technology Letters, Jan. 2018-present.
- Guest Editor, physica status solidi (b) for the International Workshop on Nitride Semiconductors (IWN) 2016.
- Reviewer for: ACS Photonics, Applied Optics, Applied Physics Letters, IEEE Journal of Selected Topics in Quantum Electronics, IEEE Photonics, IEEE Photonic Technology Letters, IEEE Nanotechnology Magazine, IEEE Spectrum, IEEE Transactions on Electron Devices, Japanese Journal of Applied Physics, Journal of Applied Physics, Journal of Crystal Growth, Journal of Physical Chemistry, Lasers and Photonics Reviews, Materials Science B, Nature Light Science and Applications, Nature Photonics, Nano Letters, Materials, Optics Express, Optical Materials Express, Physica Status Solidi a, Physica Status Solidi b, Physica Status Solidi c, Scientific Reports, Semiconductor Science and Technology, Solid-State Electronics, and Superlattices and Microstructures.

Teaching

Teaching interests:

Semiconductor devices, semiconductor physics, optoelectronic devices, electromagnetics, quantum mechanics, semiconductor lasers and LEDs, photonic crystals, power electronic devices, solid-states physics, applied quantum mechanics, semiconductor device simulation, photovoltaics and photodetectors, semiconductor device processing, patents, and intellectual property

Instructed courses and evaluations:

2000 Fall MatE 153 (at San Jose State)

2015 Fall ECE 325/425 Semiconductor Lasers I

Course evaluations:

1. Overall, the instructor's teaching was effective: 5/5
2. Overall, the quality of the course was good: 5/5
3. The instructor knew the subject well 4.57/5
4. The instructor was generally well prepared for the class 5/5

2016 Spring ECE 308 Physics and Models of Semiconductor Devices

Course evaluations:

1. Overall, the instructor's teaching was effective: 4.75/5
2. Overall, the quality of the course was good: 4.63/5
3. The instructor knew the subject well 4.25/5
4. The instructor was generally well prepared for the class 4.88/5

2016 Fall ECE 325/425 Semiconductor Lasers I

Course evaluations:

1. Overall, the instructor's teaching was effective: 5/5
2. Overall, the quality of the course was good: 5/5
3. The instructor knew the subject well 5/5
4. The instructor was generally well prepared for the class 4.83/5

ECE 492 Graduate Independent Study

2017 Spring ECE 126 Fundamentals of Semiconductor Devices

Course evaluations:

1. Overall, the instructor's teaching was effective: 5/5
2. Overall, the quality of the course was good: 5/5
3. The instructor knew the subject well 5/5
4. The instructor was generally well prepared for the class 4.94/5

ECE 492 Graduate Independent Study

2017 Fall ECE 325/425 Semiconductor Lasers I

Course evaluations:

1. Overall, the instructor's teaching was effective: 4.83/5
2. Overall, the quality of the course was good: 4.83/5
3. The instructor knew the subject well 4.5/5
4. The instructor was generally well prepared for the class 4.67/5

ECE 492 Graduate Independent Study

ENGR 5

2018 Spring ECE 126 Fundamentals of Semiconductor Devices

Course evaluations:

1. Overall, the instructor's teaching was effective: 4.74/5
2. Overall, the quality of the course was good: 4.78/5
3. The instructor knew the subject well 4.87/5
4. The instructor was generally well prepared for the class 4.78/5

ECE 492 Graduate Independent Study

2018 Fall ECE 350/450 Semiconductor Optoelectronics

Course evaluations:

1. The instructor presented content in an organized manner: 4.75/5
2. The instructor's teaching methods contributed to my understanding: 4.75/5
3. The instructor gave me constructive feedback: 5/5
4. The course increased my knowledge of the subject matter: 5/5

ECE 492 Graduate Independent Study

ECE 499 Graduate Dissertation

2019 Spring ECE 126 Fundamentals of Semiconductor Devices

ECE 308 Physics and Models of Semiconductor Devices

ECE 492 Graduate Independent Study

Advising

Current graduate research students:

1. Matt Peart
Research topic/Thesis: "Simulations of III-nitride power electronic devices",
Duration: June 2016- expected graduation date of May 2020
2. Xiongliang Wei
Research topic/Thesis: "Monodisperse III-nitride quantum dots",

Duration: June 2016-expected graduation date of May 2020

3. Syed Ahmed Al Muyeed
Research topic/Thesis: “Green-red emitters with III-nitride interlayer active regions”,
Duration: Sept 2016- expected graduation date of May 2020

Current undergraduate researchers:

1. Rebecca Lentz
Funding: Clare Boothe Luce Scholar Program
Research topic: Differential Carrier Lifetimes in III-nitrides
Duration: Summer 2017 – present

Master’s student supervised:

1. Matt Peart
Research topic/Thesis: “The Faraday Effect in Gallium Nitride”
Duration: Sept 2015-May 2016
Placement: Currently a PhD student at Lehigh
2. Xiongliang Wei
Research topic (no thesis): “Quantum Dot Etching”
Duration: Sept 2015-May 2016
Placement: Currently a PhD student at Lehigh

Undergraduate researchers supervised:

1. Seth Slavin
Funding: Undergraduate Research Program
Research topic: Corrective Running Socks
Duration: Fall 2017- Spring 2018
2. Jasper Chumba
Research topic: Programing of an LED test station
Duration: Summer 2017
3. Alexander Goff
Research topic: Kilovolt Bias Tee
Duration: Summer 2017

Post-doctoral associates supervised:

1. Benjamin Bryant
Location: Sandia National Laboratories and Univ. of New Mexico,
Research Topic: Differential carrier lifetimes in III-nitrides.
Duration: Sept 2013-July 2015
Placement: Avogy
Current employment: Alta Devices

Visiting researchers supervised:

1. Elly Tsai
Research topic: Light extraction in nanowire LEDs.

Jonathan J. Wierer, Jr.



Duration: Sept 2016-Oct 2017
Placement: glo-USA
Current employment: Start-up

Service at Lehigh University

- Lehigh University, Graduate Research Council, Fall 2018.
- ECE department, Graduate student committee, 2015 - present
- ECE department, Seminar speaker committee, 2015 - present
- ECE department, Lehigh ECE 125th Anniversary committee, 2017-2018
- Center for Photonics and Nanoelectronics, Member, 2015 - present
- Center for Photonics and Nanoelectronics, Nanofabrication facilities committee, 2017 - present