

## 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 research 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 to the research and development of FCLEDs, and he led them into successful manufacturing. Today most high-power LEDs are some variation of his 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 critical 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 more substantial research efforts into this area by other researchers and companies.

At Lehigh University he is continuing his research on semiconductor device physics and materials. Building on his previous experiences, he has several efforts on light-emitters for SSL and displays. This work includes investigating quantum dot active layers as a method to overcome Auger recombination to create higher efficiency LEDs and laser diodes. Here he has demonstrated a synthesis method that creates controlled ensembles of QDs where the QD's energies are in a narrow distribution. Controlled QDs are the "holy grail" of QD research; something has yet to be achieved in any III-V compound semiconductor. He has also been researching long-wavelength visible (green to red) InGaN LEDs using AlGaN interlayer quantum well designs. This work has revealed that a tensile AlGaN interlayer is a means to control the compressive strain of InGaN quantum wells and prevent defect formation for higher efficiencies. He is also researching III-nitride micro-LEDs for displays and revealing

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the research paths that are necessary to advance display efficiency. Another research area Jonathan is pursuing is new wide-bandgap power electronic devices with III-nitride semiconductors. The wide bandgap leads to higher critical electric fields and higher breakdown voltages. This power device work includes investigating novel edge termination schemes and ultra-wide bandgap III-nitride semiconductors such as AlGa<sub>N</sub> and AlIn<sub>N</sub>. One exciting result of this work is the oxidation of AlIn<sub>N</sub> using thermal wet oxidation to form native AlInO layers. It was a widely held belief that this oxidation process could not be done in III-nitrides. This new native oxide has the potential to create new device architectures similar to the oxides of Si and AlGaAs.

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 the Optical Society of America, and a member of Illumination Engineering Society and the International Society for Optics and Photonics.

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### Contact Information

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### Academic Degrees

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- 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

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- 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 Principal Member of Technical Staff  
Sandia National Laboratories, Albuquerque, NM  
Semiconductor Materials and Device Sciences

March 2013-June 2013	Acting Manager (concurrent with Technical Staff position) 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 employment) 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

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- Published Refereed Publications: 60 (3 under review)
- Conference Presentations: 109, Invited: 23
- Patents:
  - [US Patents](#): 39, US Applications: 2
  - European Patents: 35
- Book Chapters: 3
- Conference Proceedings: 7
- News Items: 33
- Google Scholar: <http://scholar.google.com/citations?hl=en&user=mnUvAGMAAAAJ>
  - Citations: 6972, h-index: 40, i10-index: 74

- Web of Science ResearcherID: <https://publons.com/researcher/1389951/jonathan-j-wierer-jr>
  - Citations: 3157, h-index: 23, Ave Citations Per Article: 43.3
- Mendeley: <https://www.mendeley.com/profiles/jonathan-wierer/>
  - Citations: 3468, h-index 24
- ORCID: <https://orcid.org/0000-0001-6971-4835>

## Publications

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1. M. R. Peart, and J. J. Wierer, Jr., "Edge Termination for III-Nitride Power Devices using Polarization Engineering", submitted (2019).
2. S. A. A. Mueyed, W. Sun, M. R. Peart, R. M. Lentz, X. Wei, D. Borovac, R. Song, N. Tansu, and J. J. Wierer, Jr., "Recombination Rates in Green-Yellow InGaN-Based Multiple Quantum Wells", submitted (2019).
3. J. J. Wierer, Jr. and N. Tansu, "III-nitride micro-LEDs for efficient emissive displays" *Lasers and Photonics Review* (2019). DOI: [10.1002/lpor.201900141](https://doi.org/10.1002/lpor.201900141)
4. M. R. Peart, X. Wei, D. Borovac, W. Sun, N. Tansu, and J. J. Wierer, Jr., "Thermal Oxidation of AlInN for III-nitride Electronic and Optoelectronic Devices", *ACS Applied Electronic Materials* (2019). DOI: [10.1021/acsaelm.9b00266](https://doi.org/10.1021/acsaelm.9b00266)
5. X. Wei, S. A. A. Mueyed, 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)
6. 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)
7. W. Sun, S. A. A. Mueyed, 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)
8. 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)
9. S. A. A. Mueyed, 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 AlGaIn interlayers", *AIP Advances* 7, 105312 (2017). DOI: [10.1063/1.5000519](https://doi.org/10.1063/1.5000519)
10. 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)
11. 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)
12. 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<sub>0.3</sub>Ga<sub>0.7</sub>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)

13. 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](#)
14. 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)
15. 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)
16. 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)
17. J. J. Wierer, Jr., A. A. Allerman, E. J. Skogen, A. Tauke-Pedretti, G. A. Vawter, and I. Montano, “Selective layer disordering in intersubband  $\text{Al}_{0.028}\text{Ga}_{0.972}\text{N}/\text{AlN}$  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)
18. 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  $\text{Al}_{0.7}\text{Ga}_{0.3}\text{N}$ ” *J. Appl. Phys.* 117, 185704 (2015). DOI: [10.1063/1.4920926](https://doi.org/10.1063/1.4920926)
19. 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)
20. 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](#)
21. 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)
22. 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)
23. 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)
24. 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)
25. 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)

26. 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 AlGa<sub>N</sub>-based deep ultraviolet light-emitting diodes”, J. Applied Physics, 116, 053104 (2014). DOI: [10.1063/1.4891830](https://doi.org/10.1063/1.4891830)
27. 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](#)
28. J. J. Wierer, Jr., I. Montano, M. H. Crawford, and A. A. Allerman, “Effect of thickness and carrier density on the optical polarization of Al<sub>0.44</sub>Ga<sub>0.56</sub>N/Al<sub>0.55</sub>Ga<sub>0.45</sub>N quantum well layers,” J. Appl. Phys. 115, 174501 (2014). DOI:[10.1063/1.4874739](https://doi.org/10.1063/1.4874739)
29. 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](#)
30. 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](#)
31. D. D. Koleske, J. J. Wierer, Jr., A. J. Fischer, and S. R. Lee, “Controlling indium incorporation in InGa<sub>N</sub> 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)
32. 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)
33. 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)
34. 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 213) DOI:[10.1002/lpor.201300048](https://doi.org/10.1002/lpor.201300048), Altmetric: [24](#)
35. 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/InGa<sub>N</sub> Core-Shell Nanowire Array Light Emitting Diode”, Nano Letters, 13, 4317 (2013). DOI:[10.1021/nl4021045](https://doi.org/10.1021/nl4021045)
36. 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/InGa<sub>N</sub> 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](#)
37. 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 InGa<sub>N</sub>-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)
38. 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 Ga<sub>N</sub> 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](#)
39. 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 95) DOI:[10.1088/0957-4484/23/19/194007](https://doi.org/10.1088/0957-4484/23/19/194007)
  40. 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)
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  42. J. J. Wierer, Jr., A. A. Allerman, and Q. Li, “Silicon impurity-induced layer disordering of AlGaN/AlN superlattices”, *Appl. Phys. Lett.*, 97, 051907 (2010). DOI: [10.1063/1.3478002](https://doi.org/10.1063/1.3478002)
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  44. 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 609) DOI:[10.1038/nphoton.2009.21](https://doi.org/10.1038/nphoton.2009.21), Altmetric: [3](#)
  45. N. F. Gardner, J. C. Kim, J. J. Wierer, M. R. Krames, and Y-C. Shen “Polarization Anisotropy in the Electroluminescence of m-plane InGaN Light-Emitting Diodes,” *Appl. Phys. Lett.* 86, 111101 (2005). DOI:[10.1063/1.1875765](https://doi.org/10.1063/1.1875765), Altmetric: [3](#)
  46. J. J. Wierer, M. R. Krames, J. E. Epler, N. F. Gardner, M. G. Craford, J. R. Wendt, J. A. Simmons, M. M. Sigalas, “InGaN/GaN Quantum-Well Heterostructure Light-Emitting Diodes Employing Photonic Crystal Structures,” *Appl. Phys. Lett.* 84, pp. 3885 (2004). (Cited 447) DOI:[10.1063/1.1738934](https://doi.org/10.1063/1.1738934), Altmetric: [6](#)
  47. 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 InGaN/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)
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## Conference Presentations

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1. M. R. Peart and J. J. Wierer, Jr., "Polarization Edge Termination for GaN Vertical Power Devices", 13<sup>th</sup> International Conference on Nitride Semiconductors (July 2019), Bellevue, WA.
2. R. M. Lentz, M. R. Peart, and J. J. Wierer, Jr., "GaN/AlInO Waveguide for Visible Light Communications", 13<sup>th</sup> International Conference on Nitride Semiconductors (July 2019), Bellevue, WA.
3. X. Wei, S. A. A. Muyeed, M. Peart, N. Tansu, and J. J. Wierer, Jr., "Room Temperature Luminescence of Passivated InGaN Quantum Dots Formed by Quantum-Sized-Controlled Photoelectrochemical Etching", 13<sup>th</sup> International Conference on Nitride Semiconductors (July 2019), Bellevue, WA.
4. M. R. Peart, X. Wei, D. Borovac, W. Sun, N. Tansu, and J. J. Wierer, Jr., "Wet Thermal Oxidation of AlInN", 13<sup>th</sup> International Conference on Nitride Semiconductors (July 2019), Bellevue, WA.
5. M. R. Peart, D. Borovac, W. Sun, N. Tansu, and J. J. Wierer, Jr., "AlInN Power Diodes", 13<sup>th</sup> International Conference on Nitride Semiconductors (July 2019), Bellevue, WA.
6. X. Wei, S. A. A. Muyeed, M. Peart, N. Tansu, and J. J. Wierer, Jr., "Room Temperature Luminescence of Passivated InGaN Quantum Dots Formed by Quantum-Sized-Controlled Photoelectrochemical Etching", 61<sup>th</sup> Electronic Materials Conference (June 2019), Ann Arbor, MI.
7. M. Peart and J. J. Wierer, Jr., "Polarization Edge Termination for GaN Vertical Power Devices", 61<sup>th</sup> Electronic Materials Conference (June 2019), Ann Arbor, MI.
8. M. R. Peart, D. Borovac, W. Sun, N. Tansu, and J. J. Wierer, Jr., "AlInN for Vertical Power Electronic Devices", 61<sup>th</sup> Electronic Materials Conference (June 2019), Ann Arbor, MI.
9. M. R. Peart, X. Wei, D. Borovac, W. Sun, N. Tansu, and J. J. Wierer, Jr., "Wet Thermal Oxidation of AlInN", 61<sup>th</sup> Electronic Materials Conference (June 2019), Ann Arbor, MI.
10. S. A. A. Muyeed, 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.
11. 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).
12. 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.
13. 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.
14. 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 AlGaN interlayers", IEEE Photonics Conference 2018, (October 2018) Reston, VA.
15. M. Peart, N. Tansu, and J. J. Wierer, Jr., "AlInN for Vertical Power Electronic Devices", Les Eastman Conference 2018 (August 2108), Columbus, OH.

16. 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).
17. 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)
18. 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).
19. 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 AlGa<sub>N</sub> interlayers", SPIE Photonics West (February 2018) San Francisco, CA.
20. 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).
21. 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).
22. 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).
23. 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).
24. 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).
25. 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.
26. 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.
27. S. A. Al Muyeed, W. Sun, X. Wei, R. Song, N. Tansu, and J. J. Wierer, Jr., “Strain balancing in InGaN-based multiple quantum wells using AlGa<sub>N</sub> interlayers”, 59<sup>th</sup> Electronic Materials Conference (June 2017), South Bend, IN.
28. 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).

29. 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)
30. 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.
31. 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 AlGa<sub>N</sub> alloys", SPIE Photonics West (February 2017) San Francisco, CA.
32. 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.
33. 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.
34. 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.
35. J. J. Wierer Jr., and N. Tansu, "Research areas for ultra-efficient solid-state lighting", EERE-SSL Roundtable, (September 2016), Washington D. C.
36. 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.
37. 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.
38. 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).
39. 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.
40. 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)
41. C.-K. Tan, W. Sun, D. Borovac, J. J. Wierer, Jr., and N. Tansu, "InGa<sub>N</sub>-Ga<sub>N</sub>As 'Interface Quantum Well' for Long Wavelength Emission", DOE SSL Workshop, (February 2016) Raleigh, NC. (invited, student award winner)
42. J. J. Wierer, Jr. "Edge termination in vertical GaN diodes/Opportunity for GaN substrates in SSL", Roadmapping for GaN Workshop, (January 2016) Davis, CA.
43. 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.

44. 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 AlGa<sub>N</sub> Epilayers for UV Laser Diodes and Devices for Power Electronics," 228<sup>th</sup> ECS Meeting (October 2015), Phoenix, AZ.
45. 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," 228<sup>th</sup> ECS Meeting (October 2015), Phoenix, AZ.
46. J. J. Wierer, Jr. and N. Tansu, "Breakthrough research leading to ultra-efficient solid-state lighting", EERE-SSL Roundtable, (September 2015), Washington D. C.
47. 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/AlGa<sub>N</sub> Superlattices", ACCGE (August 2015), Big Sky, MT.
48. 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 AlGa<sub>N</sub> templates", IEEE Summer Topical Meeting (July 2015), Nassau, Bahamas.
49. 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 Ga<sub>N</sub> Diodes", 57<sup>th</sup> Electronic Materials Conference (June 2015), Columbus, Ohio.
50. 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 Ga<sub>N</sub> P-i-N Diode", 57<sup>th</sup> Electronic Materials Conference (June 2015), Columbus, Ohio.
51. 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", 57<sup>th</sup> Electronic Materials Conference (June 2015), Columbus, Ohio.
52. 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/AlGa<sub>N</sub> Superlattices", 57<sup>th</sup> Electronic Materials Conference (June 2015), Columbus, Ohio.
53. 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)
54. J. J. Wierer, Jr., and J. Y. Tsao, "Laser diodes in solid-state lighting", CS International (March 2015), Frankfurt, Germany. (Keynote)
55. 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.
56. 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.
57. 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.

58. 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.
59. J. J. Wierer, Jr., and J. Y. Tsao, "Laser diodes in solid-state lighting", SPIE Optics and Photonics (August 2014), San Diego, CA. (invited)
60. J. J. Wierer, Jr., "Research trends and future directions for solid-state lighting", IES Regional Conference, (July 2014), Albuquerque NM. (invited)
61. 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.
62. 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", 56<sup>th</sup> Electronic Materials Conference, (June 2014), Santa Barbara, CA.
63. J. J. Wierer, Jr., I. Montano, M. H. Crawford, and A. A. Allerman, "Anisotropic optical polarization of AlGa<sub>N</sub> based 275 nm light-emitting diodes due to quantum-size effects," CLEO, (June 2014), San Jose, CA.
64. 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<sub>N</sub> Coupled Quantum Wells", 5<sup>th</sup> International Symposium on Growth of III-Nitrides, (May 2014), Atlanta, GA.
65. 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", 5<sup>th</sup> International Symposium on Growth of III-Nitrides, (May 2014), Atlanta, GA.
66. 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).
67. 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.
68. 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/InGa<sub>N</sub> Nanowire Array Solar Cells by using Scanning Photocurrent Microscopy", Fall MRS Meeting, (December 2013), Boston, MA.
69. 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)
70. 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.
71. 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.
72. 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.

73. 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)
74. A. A. Allerman, J. J. Wierer, Q. Li, M. H. Crawford, and S. R. Lee, "Impurity-Induced Disorder in Si- and Mg-Doped AlGa<sub>N</sub>-AlN Superlattices" Meeting of the Electrochemical Society (October 2012) Honolulu HI.
75. 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.
76. 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.
77. A. A. Allerman, J. J. Wierer, Q. Li, S. R. Lee, and M. H. Crawford, "MOVPE Growth of Intersubband Absorption in AlN-AlGa<sub>N</sub> Superlattices, "16<sup>th</sup> MOVPE Conference, (May 2012), Seoul, South Korea.
78. 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.
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## Honors/Awards

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- Senior Member of the Optical Society of America, 2019.
- 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

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- IEEE: Senior Member 2011-present, Member 1998-2011.
- OSA: Senior Member 2019-present, Member 2011-2019.
- IES: Member 2014-present.
- SPIE: Member 2016-present

## Conference Activities

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- 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

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- 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 Materials, 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

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### 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

### Courses Taught

- 2000 Fall MatE 153 (at San Jose State)
- 2015 Fall ECE 325/425 Semiconductor Lasers I
- 2016 Spring ECE 308 Physics and Models of Semiconductor Devices
- 2016 Fall ECE 325/425 Semiconductor Lasers I
- 2017 Spring ECE 126 Fundamentals of Semiconductor Devices
- 2017 Fall ECE 325/425 Semiconductor Lasers I  
ENGR 5
- 2018 Spring ECE 126 Fundamentals of Semiconductor Devices
- 2018 Fall ECE 350/450 Semiconductor Optoelectronics
- 2019 Spring ECE 126 Fundamentals of Semiconductor Devices  
ECE 308 Physics and Models of Semiconductor Devices  
ECE 492 Graduate Independent Study
- 2019 Fall ECE 350/450 Semiconductor Optoelectronics  
ECE 492 Graduate Independent Study

### Course evaluation scores (Fall 2015-Spring 2018)

Semester	Course Number	Course Credits	# Grades Assigned	Mean Question 1	Mean Question 2	Mean Question 14
Fall 2015	ECE 325/425	3	7	5	5	4.67
Spring 2016	ECE 308	3	8	4.75	4.63	4.25
Fall 2016	ECE 325/425	3	6	5	5	4.83
Spring 2017	ECE 126	3	22	5	5	4.69
Fall 2017	ECE 325/425	3	8	4.83	4.83	4.67
Fall 2017	ENGR 5	2	54	NA	NA	NA
Spring 2018	ECE 126	3	29	4.74	4.78	4.82

Notes: Evaluations are not performed for instructors in ENGR 5.

Answers are on a scale of 1-5 with 5 the highest

Question 1: Overall, the instructor's teaching was effective.

Question 2: Overall, the quality of the course was good.

Question 14: I learned a great deal in this course.

### Course evaluation scores (Spring 2018-Fall 2019)

Semester	Course Number	Course Credits	Grades Assigned	Mean Quest I1	Mean Ques I2	Mean Ques I3	Mean Ques I4	Mean Ques I5	Mean Ques I6
Fall 2018	ECE 350	3	6	4.75	4.75	5	5	5	5
Spring 2019	ECE 126	3	27	4.79	4.86	4.5	4.29	4.79	4.86

Spring 2019	ECE 308	3	11	4.78	4.44	4.78	4.78	5	4.89
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- Notes: Answers are on a scale of 1-5 with 5 the highest*
- Question 11: Instructor presented content in an organized manner.*
- Question 12: The instructor's teaching methods contributed to my understanding of the course material.*
- Question 13: The instructor was responsive when I had difficulties or questions.*
- Question 14: The instructor gave me constructive feedback.*
- Question 15: The instructor's assignments (i.e. projects, homework, papers, etc.) provided opportunities for participative learning within the course.*
- Question 16: The course increased my knowledge of the subject matter.*

## Advising

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### Current graduate research students:

1. Matt Peart  
 Research topic/Thesis: "III-nitride power electronic devices",  
 Duration: June 2016- expected PhD graduation date of Dec 2020
2. Xiongliang Wei  
 Research topic/Thesis: "Monodisperse III-nitride quantum dots",  
 Duration: June 2016-expected PhD graduation date of May 2021
3. Syed Ahmed Al Mueyed  
 Research topic/Thesis: "Green-red emitters with III-nitride interlayer active regions",  
 Duration: Sept 2016- expected PhD graduation date of Dec 2020
4. Elia Palmese  
 Research topic/Thesis: "III-nitride power transistors",  
 Duration: Sept 2016- expected PhD graduation date of Dec 2024
5. Siyuan Guo  
 Research topic/Thesis: "III-nitride Photonic Integrated Circuits",  
 Duration: Sept 2016- expected MS graduation date of May 2020

### Current undergraduate researchers:

1. Sydney Wisniewski  
 Duration: Summer 2019 – present
2. Chengxin Yu  
 Duration: Summer 2019 – 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
4. Rebecca Lentz  
Funding: Clare Boothe Luce Scholar Program  
Research topic: Differential Carrier Lifetimes in III-nitrides  
Duration: Summer 2017 – Summer 2019  
Placement: PhD student at Univ. of Mich.

**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.  
Duration: Sept 2016-Oct 2017  
Placement: glo-USA  
Current employment: Raxium

**Service at Lehigh University**

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- Lehigh University, Internal Review Committee, Fall 2019-present.
- 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 125<sup>th</sup> Anniversary committee, 2017-2018
- Center for Photonics and Nanoelectronics, Member, 2015 - present

Jonathan J. Wierer, Jr.



- Center for Photonics and Nanoelectronics, Nanofabrication facilities committee, 2017 - present