

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

Jonathan Wierer is a professor in the Department of Electrical and Computer Engineering at North Carolina State University. His research interests include semiconductor device physics and semiconductor materials science. Specifically, he has made seminal contributions to III-nitride electronic and optoelectronic devices. Over his career, he has performed research across various organizations (university, industry, and national laboratory), exposing him to different perspectives on semiconductor device research. This research has resulted in a lengthy patent portfolio and highly referenced journal articles.



Jonathan received his M.S., B.S., and Ph.D. in electrical engineering from the University of Illinois at Urbana-Champaign in 1994, 1995, and 1999, respectively. His Ph.D. advisor was Nick Holonyak, Jr., and his thesis research topic was tunnel junctions in InGaAs light emitters. This was the first time tunnel junctions were used in LEDs and laser diodes, enabling efficient current rerouting and removing absorptive p-type layers. This method now enables near-infrared, vertical-cavity surface-emitting lasers, and it is also being developed 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 drastically differed 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, leading them into successful manufacturing. Today, most high-power LEDs are variations on this original FCLED.

Later, at Lumileds, he joined the Advanced Laboratories pursuing high-risk, long-term LED research. There, he primarily investigated [photonic crystal LEDs](#). His seminal papers on photonic crystal LEDs demonstrated the ability to control emission patterns and established records in extraction efficiency. His most cited and patented works include his photonic crystal LED research.

In 2008, he joined Sandia National Laboratories. 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 in III-nitride LEDs (efficiency droop). This work began more substantial research efforts into this area by other researchers and companies.

From 2015-2021, he was a professor at Lehigh University, and his work included investigating [InGaN-based quantum dot active layers](#) to create higher-efficiency LEDs and laser diodes. Here, his group worked on synthesis methods that create controlled ensembles of QDs. He has also been researching long-wavelength visible (green to red) InGaN LEDs using AlGaIn interlayer quantum well designs. This work has revealed that a tensile AlGaIn interlayer is a means to control the compressive strain of InGaIn quantum wells and prevent defect formation for higher efficiencies. Another research area Jonathan pursued at Lehigh was 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 AlGaIn and AlInN. One exciting result of this work is the [thermal oxidation of AlInN](#) to form native AlInO layers. He continues his semiconductor device physics and materials research at NC State University, working in III-nitride photonics and power electronic devices.

Dr. Wierer has authored or co-authored over 200 journal publications and conference presentations and holds [42 patents](#), predominately related to III-nitride devices. He is a senior editor for [IEEE Photonics Technology Letters](#) and an associate editor for the [IEEE Journal of Quantum Electronics](#). He is a Fellow of Optica (formerly OSA) and is a senior member of the Institute of Electrical and Electronics Engineers.

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

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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: Overview of the Far Infrared p-type Ge Laser
- B.S. Electrical Engineering University of Illinois, Champaign Urbana, IL 1990-94
- Honors

### Professional Experience

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| Aug 2021-present     | Professor<br>North Carolina State University, Raleigh, NC<br>College of Engineering<br>Electrical and Computer Engineering         |
| June 2021 - Aug 2021 | Adjunct Professor<br>North Carolina State University, Raleigh, NC<br>College of Engineering<br>Electrical and Computer Engineering |
| July 2015 - Aug 2021 | Associate Professor<br>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  
Hewlett Packard, San Jose, CA/Agilent/Lumileds Lighting  
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: 77 (1 submitted)
- Conference Presentations: 135, Invited: 30
- Patents:
  - [US Patents](#): 42 (search: Wierer.IN. *AND* Jonathan.IN.)
  - [PatentGURU](#)
  - European Patents: 35
- Book Chapters: 3
- Conference Proceedings: 7
- News Items: 39
- Google Scholar: <https://scholar.google.com/citations?user=mnUvAGMAAAAJ&hl=en>
  - Citations: 9776, h-index: 47, i10-index: 90
- Web of Science ResearcherID: <https://www.webofscience.com/wos/author/record/1380925>
  - Citations: 4941, h-index: 31
- ORCID: <https://orcid.org/0000-0001-6971-4835>

## Additional Web Information

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- [AcademicTree](#)
- [ScholarGPS](#)
- [ResearchGate](#)
- [Linkedin](#)
- [Scopus](#)
- [Kudos](#)
- [Semantic Scholar](#)
- [AMiner](#)
- [AD Scientific index](#)
- [Scite](#)
- [Research.com](#)

## Publications

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1. Daniel Rogers, Haotian Xue, Fred Kish, Fu-Chen Hsiao, Bardia Pezeshki, Alex Tselikov, and [Jonathan J. Wierer, Jr.](#), “High Bandwidth GaN-based Micro-LEDs for Visible Light Communications at Temperatures up to 400°C,” submitted IEEE Photonics Technology Letters.
2. H. Xue, E. Palmese, B. J. Sekely, B. D. Little, F. A. Kish, Jr., J. F. Muth, and [J. J. Wierer Jr.](#), “Growth and Characterization of AlInN/GaN Superlattices,” *Journal of Crystal Growth*, 630, 127567 (2024). DOI: [10.1016/j.jcrysgro.2024.127567](https://doi.org/10.1016/j.jcrysgro.2024.127567)
3. E. Palmese, H. Xue, S. Pavlidis, and [J. J. Wierer Jr.](#), “Enhancement-Mode AlInN/GaN High-Electron-Mobility Transistors Enabled by Thermally Oxidized Gates,” *IEEE Transactions on Electron Devices*, 71, 1003 (2023). DOI: [10.1109/TED.2023.3343313](https://doi.org/10.1109/TED.2023.3343313)
4. H. Xue, E. Palmese, R. Song, M. I. Chowdhury, N. C. Strandwitz, and [J. J. Wierer Jr.](#), “Structural and Optical Characterization of Thin AlInN Films on c-Plane GaN Substrates,” *Journal of Applied Physics*, 134, 075301 (2003). DOI: [10.1063/5.0136004](https://doi.org/10.1063/5.0136004)

5. E. Palmese, H. Xue, R. Song, and J. J. Wierer Jr., "Thermal Oxidation of Lattice Mismatched  $\text{Al}_{1-x}\text{In}_x\text{N}$  films on GaN," *e-Prime - Advances in Electrical Engineering, Electronics and Energy*, 5, 100208 (2023). DOI: [10.1016/j.prime.2023.100208](https://doi.org/10.1016/j.prime.2023.100208)
6. L. Shvilberg, T. Mimura, H. Xue, J. J. Wierer Jr., El. A. Paisley, H. Heinrich, and J. F. Ihlefeld "Electrical Performance of Sputtered Epitaxial Magnesium Oxide on *n*-Type Gallium Nitride Metal-Oxide-Semiconductors Devices," *IEEE Transactions on Electron Devices*, 70, 3442 (2023). DOI: [10.1109/TED.2023.3269406](https://doi.org/10.1109/TED.2023.3269406)
7. X. Wei, S. A. A. Muyeed, H. Xue, and J. J. Wierer, Jr., "Anisotropic Etching of InGaN Thin Films with Photoelectrochemical Etching to Form Quantum Dots," *Materials*, 16, 1890 (2023). DOI: [10.3390/ma16051890](https://doi.org/10.3390/ma16051890)
8. H. Xue, S. A. A. Muyeed, E. Palmese, D. Rogers, R. Song, N. Tansu, and J. J. Wierer, Jr., "Recombination rate analysis of InGaN-based red-emitting light-emitting diodes," *IEEE Journal of Quantum Electronics*, 59, 3200109, (2023). DOI: [10.1109/JQE.2023.3246981](https://doi.org/10.1109/JQE.2023.3246981)
9. I. Fragkos, W. Sun, D. Borovac, R. Song, J. J. Wierer Jr., and N. Tansu, "Delta InN-InGaN Quantum Wells with AlGaN Interlayers for Long Wavelength Emission," *IEEE Journal of Quantum Electronics*, 58, 3600106 (2022). DOI: [10.1109/JQE.2022.3142270](https://doi.org/10.1109/JQE.2022.3142270)
10. X. Wei, S. A. A. Muyeed, H. Xue, E. Palmese, R. Song, N. Tansu, and J. J. Wierer, Jr., "Near-Infrared Electroluminescence of AlGaN Capped InGaN Quantum Dots Formed by Controlled Growth on Photoelectrochemical Etched Quantum Dot Templates," *Photonics Research*, 10, 33 (2022). DOI: [10.1364/PRJ.441122](https://doi.org/10.1364/PRJ.441122)
11. S. A. A. Muyeed, D. Borovac, H. Xue, X. Wei, R. Song, N. Tansu, and J. J. Wierer, Jr., "Recombination rates of  $\text{In}_x\text{Ga}_{1-x}\text{N}/\text{Al}_y\text{Ga}_{1-y}\text{N}/\text{GaN}$  multiple quantum wells emitting from 640 to 565 nm," *IEEE Journal of Quantum Electronics*, 57, 3200207 (2021). DOI: [10.1109/JQE.2021.3111402](https://doi.org/10.1109/JQE.2021.3111402)
12. E. Palmese, M. R. Peart, D. Borovac, R. Song, N. Tansu, and J. J. Wierer, Jr., "Thermal Oxidation Rates and Resulting Optical Constants of  $\text{Al}_{0.83}\text{In}_{0.17}\text{N}$  Films Grown on GaN," *Journal of Applied Physics*, 129, 125105 (2021). DOI: [10.1063/5.0035711](https://doi.org/10.1063/5.0035711)
13. M. R. Peart, X. Wei, D. Borovac, W. Sun, R. Song, N. Tansu, and J. J. Wierer, Jr., "AllInN/GaN diodes for power electronic devices," *Applied Physics Express*, 13, 091006 (2020). DOI: [10.35848/1882-0786/abb180](https://doi.org/10.35848/1882-0786/abb180)
14. D. Borovac, W. Sun, M. R. Peart, R. Song, J. J. Wierer, Jr., and N. Tansu, "Low Background Doping in AllInN Grown on GaN via Metalorganic Vapor Phase Epitaxy," *Journal of Crystal Growth* 548, 125837 (2020). DOI: [10.1016/j.jcrysgro.2020.125847](https://doi.org/10.1016/j.jcrysgro.2020.125847)
15. O. O. Ekoko, J. C. Goodrich, A. J. Howzen, N. C. Strandwitz, J. J. Wierer, Jr., and N. Tansu "Electrical Properties of MgO/GaN Metal-Oxide-Semiconductor Structures," *Solid State Elec.* (2020). DOI: [10.1016/j.sse.2020.107881](https://doi.org/10.1016/j.sse.2020.107881)
16. S. A. A. Muyeed, X. Wei, D. Borovac, R. Song, N. Tansu, and J. J. Wierer, Jr., "Controlled growth of InGaN quantum dots on photoelectrochemically etched InGaN quantum dots templates," *Journal of Crystal Growth*, 540, 125652 (2020). DOI: [10.1016/j.jcrysgro.2020.125652](https://doi.org/10.1016/j.jcrysgro.2020.125652)
17. J. C Goodrich, T. G. Farinha, L. Ju, A. J. Howzen, A. Kundu, O. N. Ogidi-Ekoko, J. J. Wierer, Jr., N. Tansu, N. C. Strandwitz, "Surface Pretreatment and Deposition Temperature Dependence

- of MgO Epitaxy on GaN by Thermal Atomic Layer Deposition,” *Journal of Crystal Growth*, 536, 125568 (2020). DOI: [10.1016/j.jcrysgro.2020.125568](https://doi.org/10.1016/j.jcrysgro.2020.125568)
18. M. R. Peart, and J. J. Wierer, Jr., "Edge Termination for III-Nitride Power Devices using Polarization Engineering," *IEEE Transactions on Electron Devices*, 67, 571 (2020). DOI: [10.1109/TED.2019.2958485](https://doi.org/10.1109/TED.2019.2958485)
  19. D. Borovac, W. Sun, R. Song, J. J. Wierer Jr., and N. Tansu, “On the thermal stability of nearly lattice-matched AlInN films grown on GaN via MOVPE,” *Journal of Crystal Growth*, 533, 125469 (2020). DOI: [10.1016/j.jcrysgro.2019.125469](https://doi.org/10.1016/j.jcrysgro.2019.125469)
  20. S. A. A. Muyeed, 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 with AlGaIn Interlayers,” *J. Appl. Phys.* 126, 213106 (2019). DOI: [10.1063/1.5126965](https://doi.org/10.1063/1.5126965)
  21. J. J. Wierer, Jr. and N. Tansu, “III-nitride micro-LEDs for efficient emissive displays,” *Lasers and Photonics Review*, 13, 1900141 (2019). DOI: [10.1002/lpor.201900141](https://doi.org/10.1002/lpor.201900141)
  22. 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*, 1, 1367-1371 (2019). DOI: [10.1021/acsaelm.9b00266](https://doi.org/10.1021/acsaelm.9b00266)
  23. X. Wei, S. A. A. Muyeed, M. Peart, W. Sun, N. Tansu, and J. J. Wierer, Jr., “Room Temperature Luminescence of InGaIn 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)
  24. 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)
  25. W. Sun, S. A. A. Muyeed, R. Song, J. J. Wierer, Jr., and N. Tansu "Integrating AlInN Interlayers into InGaIn/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)
  26. 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)
  27. S. A. A. Muyeed, W. Sun, X. Wei, R. Song, D. D. Koleske, N. Tansu, and J. J. Wierer, Jr., “Strain compensation in InGaIn-based multiple quantum wells using AlGaIn interlayers,” *AIP Advances* 7, 105312 (2017). DOI: [10.1063/1.5000519](https://doi.org/10.1063/1.5000519)
  28. 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)
  29. 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)
  30. 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)
  31. 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)

32. 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)
33. 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)
34. 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)
35. 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<sub>0.028</sub>Ga<sub>0.972</sub>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)
36. 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<sub>0.7</sub>Ga<sub>0.3</sub>N" *J. Appl. Phys.* 117, 185704 (2015). DOI:[10.1063/1.4920926](https://doi.org/10.1063/1.4920926)
37. 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)
38. 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)
39. 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)
40. 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)
41. 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)
42. 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)
43. 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)
44. 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)

45. 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)
46. 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)
47. 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)
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## Presentations: Conferences and Seminars

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1. H. Xue, E. Palmese, R. Song, M. I. Chowdhury, N. C. Strandwitz, and J. J. Wierer Jr., "Epitaxial Growth and Characterization of AlInN/GaN Superlattices," 66th Electronic Materials Conference, College Park, MD (July 2024).
2. E. Palmese, H. Xue, S. Pavlidis, and J. J. Wierer Jr., "Enhancement-Mode AlInN/GaN High-Electron-Mobility Transistors Via Thermally Oxidized Gates," 66th Electronic Materials Conference, College Park, MD (July 2024).
3. L. Shvilberg, H. Xue, J. J. Wierer Jr., N. Shukla, F. Ihlefeld "The Deposition Temperature Impact in Sputtered Magnesium Oxide on n-Type Gallium Nitride for Metal-Oxide-Semiconductor Capacitors Applications," 66th Electronic Materials Conference, College Park, MD (July 2024).
4. Daniel Rogers, Haotian Xue, Fred Kish, Bardia Pezeshki, Alex Tselikov, and Jonathan J. Wierer, Jr., "Recombination Rate Analysis of High-Speed Blue InGaN/GaN micro-LEDs at Elevated Temperatures," CLEO, Charlotte, NC. (May 2024).
5. H. Xue, E. Palmese, R. Song, M. I. Chowdhury, N. C. Strandwitz, and J. J. Wierer Jr., "Epitaxial Growth and Characterization of AlInN/GaN Superlattices," ICMOVPE, Las Vegas, NV (May 2024).

6. Daniel Rogers, Haotian Xue, Fred Kish, Bardia Pezeshki, Alex Tselikov, and Jonathan J. Wierer, Jr., "High Temperature and Large Bandwidth Blue InGaN/GaN Micro-LEDs," Optical Fiber Communication Conference, San Diego, CA. (March 2024).
7. H. Xue, E. Palmese, R. Song, Md I. Chowdhury, N. C. Strandwitz, and J. J. Wierer, Jr. "Structural and Optical Characterization of Thin AlInN Films on c-Plane GaN Substrates," 65th Electronic Materials Conference (July 2023).
8. J. J. Wierer, Jr., H. Xue, D. Rogers, and E. Palmese, "Interlayer-based active regions for long-wavelength III-nitride LEDs," Optica Adv. Photonics Congress PVLED, (July 2022) (invited).
9. H. Xue, S. A. A. Muyeed, E. Palmese, R. Song, N. Tansu, and J. J. Wierer, Jr., "Impact of InGaN-based underlayers on the performance of InGaN-based red-emitting LEDs," 80<sup>th</sup> Device Research Conference (July 2022), Virtual.
10. J. J. Wierer, Jr., S. A. A. Muyeed, X. Wei, H. Xue, and E. Palmese, "Size-controlled InGaN quantum dots for light emitters," Photonics North, (May 2022) (invited).
11. J. J. Wierer, Jr., "Efficient III-nitride long wavelength emitters," NC State ECE Spring Colloquium, (Feb 2022) (invited).
12. J. J. Wierer, Jr., S. A. A. Muyeed, H. Xue, X. Wei, R. Song, and N. Tansu "Efficient III-nitride LEDs for displays," 21st International Meeting on Information Display - IMID, (August 2021) Virtual (invited).
13. E. Palmese, J. Goodrich, S. A. A. Muyeed, H. Xue, X. Wei, R. Song, N. Tansu, and J. J. Wierer, Jr. "Characterization of  $A_xIn_{1-x}N$  Mismatched to GaN for Thin Oxide Applications," 63<sup>rd</sup> Electronic Materials Conference (July 2021), Virtual.
14. H. Xue, S. A. A. Muyeed, E. Palmese, R. Song, N. Tansu, and J. J. Wierer, Jr., "Red-Emitting InGaN/AlGaIn/GaN Multiple Quantum Wells with Various Underlayers," 63<sup>rd</sup> Electronic Materials Conference (July 2021), Virtual.
15. J. J. Wierer, Jr., S. A. A. Muyeed, H. Xue, X. Wei, E. Palmese, D. Rogers, and R. Song, "Researching Efficient InGaN LEDs for Displays," Clarkson University, (April 2021) Virtual (invited).
16. J. J. Wierer, Jr., X. Wei, S. A. A. Muyeed, H. Xue, R. Song, and N. Tansu "Size-controlled self-assembled InGaN quantum dots," SPIE Photonics West 2021, (February 2021) Virtual (invited).
17. J. J. Wierer, Jr., "Researching efficient III-nitride micro-LEDs for displays," Facebook's Annual AR Optics Academic Forum (Sept 2020), Virtual (invited).
18. X. Wei, S. A. A. Muyeed, M. Peart, N. Tansu, and J. J. Wierer, Jr., "Controlled growth of InGaN quantum dots on photoelectrochemically etched InGaN quantum dots templates," 62nd Electronic Materials Conference (July 2020), Virtual.
19. E. Palmese, M. R. Peart, S. A. A. Muyeed, X. Wei, R. Song, N. Tansu, and J. J. Wierer, Jr. "AlInN-GaN Based Power Electronic Devices Utilizing AlInO as a Gate Insulator," 62nd Electronic Materials Conference (July 2020), Virtual.
20. D. Borovac, W. Sun, R. Song, J. J. Wierer Jr., and N. Tansu, "High-temperature thermal stability of AlInN alloys nearly lattice-matched to GaN/sapphire grown via MOVPE," Proc. of the SPIE Photonics West 2020, Optical Components and Materials XVII, (February 2020) San Francisco, CA.

21. D. Borovac, W. Sun, M. R. Peart, R. Song, J. J. Wierer Jr., and N. Tansu, "Growth optimization and characterization of an AlInN-based p-i-n diode," Proc. of the SPIE Photonics West 2020, Gallium Nitride Materials and Devices XV, (February 2020) San Francisco, CA.
22. J. C Goodrich, T. G. Farinha, L. Ju, A. J. Howzen, A. Kundu, O. N. Ogidi-Ekoko, J. J. Wierer, Jr., N. Tansu, N. C. Strandwitz, "Structural and electrical properties of MgO on GaN by thermal atomic layer deposition" SPIE Photonics West 2020, Oxide-based Materials and Devices XI, (February 2020) San Francisco, CA.
23. S. A. A. Muyeed, X. Wei, D. Borovac, R. Song, N. Tansu, and J. J. Wierer, Jr., " Controlled growth of self-assembled InGaN quantum dots using templates of quantum-size-controlled photo-electrochemical etched quantum dots," Dept of Energy Solid State Lighting Workshop (January 2019) San Diego, CA. (winner of student poster competition).
24. 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. (poster)
25. 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. (poster)
26. 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. (poster)
27. 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. (poster)
28. 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.
29. 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," 61st Electronic Materials Conference (June 2019), Ann Arbor, MI.
30. M. Peart and J. J. Wierer, Jr.," Polarization Edge Termination for GaN Vertical Power Devices," 61st Electronic Materials Conference (June 2019), Ann Arbor, MI.
31. M. R. Peart, D. Borovac, W. Sun, N. Tansu, and J. J. Wierer, Jr.," AlInN for Vertical Power Electronic Devices," 61st Electronic Materials Conference (June 2019), Ann Arbor, MI.
32. M. R. Peart, X. Wei, D. Borovac, W. Sun, N. Tansu, and J. J. Wierer, Jr.," Wet Thermal Oxidation of AlInN," 61st Electronic Materials Conference (June 2019), Ann Arbor, MI.
33. 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 AlGaIn interlayers," SPIE Photonics West (February 2019) San Francisco, CA.
34. I. E. Fragkos, W. Sun, D. Borovac, R. B. Song, J. J. Wierer, and N. Tansu, "Delta-InN/AlGaIn Interlayer Integrated in InGaIn Active Region for Long Wavelength Emission," SPIE Photonics West 2019, Gallium Nitride Materials and Devices XIV, (February 2019) San Francisco, CA.

35. 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).
36. 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.
37. I. E. Fragkos, D. Borovac, W. Sun, R. Song, J. J. Wierer, Jr., and N. Tansu, "Experimental Studies of Delta-InN Incorporation in InGaN Quantum Well for Long Wavelength Emission," IEEE Photonics Conference (October 2018) Reston, VA. [DOI: 10.1109/IPCon.2018.8527290](https://doi.org/10.1109/IPCon.2018.8527290)
38. 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. [DOI: 10.1109/IPCon.2018.8527308](https://doi.org/10.1109/IPCon.2018.8527308)
39. 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. [DOI: 10.1109/IPCon.2018.8527340](https://doi.org/10.1109/IPCon.2018.8527340)
40. M. Peart, N. Tansu, and J. J. Wierer, Jr., "AlInN for Vertical Power Electronic Devices," Les Eastman Conference 2018 (August 2108), Columbus, OH.
41. 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).
42. 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)
43. 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).
44. 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.
45. 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).
46. 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).
47. 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).

48. 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).
49. 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).
50. 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.
51. 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.
52. 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 AlGa<sub>N</sub> interlayers," 59<sup>th</sup> Electronic Materials Conference (June 2017), South Bend, IN.
53. 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).
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24. J. J. Wierer Jr. and M. Sigalas, "LIGHT EMITTING DEVICE INCLUDING ARRAYED EMITTERS DEFINED BY A PHOTONIC CRYSTAL," [US Patent 7697584](#) (April 13, 2010)
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27. J. J. Wierer Jr., M. R. Krames, and J. E. Epler, "PHOTONIC CRYSTAL LIGHT EMITTING DEVICE," [US Patent 7442965](#) (October 28, 2008)
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36. 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)
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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). DOI: [10.1117/12.627959](#)
4. J. J. Wierer, M. R. Krames, J. Epler, N. F. Gardner, J. R. Wendt, M. M. Sigalas, S. R. J. Brueck, D. Li, and M. Y. Shagam, "III-nitride LEDs with photonic crystal structures," Proceedings of SPIE Vol. 5739, (2005). DOI: [10.1117/12.591218](#)
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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

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2. “Jonathan Wierer Elected as Fellow Member of Optica,” <https://ece.ncsu.edu/2023/jonathan-wierer-named-fellow-of-optica/>
3. “Optica Announces 2024 Fellows Class,” [https://www.optica.org/about/newsroom/news\\_releases/2023/october/optica\\_announces\\_2024\\_fellows\\_class/](https://www.optica.org/about/newsroom/news_releases/2023/october/optica_announces_2024_fellows_class/)
4. Quoted in “This Week in Tech & Culture: photon-recycling luminaires,” Architect Magazine 2023. [https://www.architectmagazine.com/design/culture/this-week-in-tech-culture-chipotles-100-electric-restaurants-the-dangers-of-artificial-intelligence-and-iconic-barbie-house-architecture\\_o](https://www.architectmagazine.com/design/culture/this-week-in-tech-culture-chipotles-100-electric-restaurants-the-dangers-of-artificial-intelligence-and-iconic-barbie-house-architecture_o)
5. Quoted in “Incandescent lamp could save energy by recycling infrared light,” NewScientist, April 2023. <https://www.newscientist.com/article/2368619-incandescent-lamp-could-save-energy-by-recycling-infrared-light/>
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7. “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>
8. “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](http://www.semiconductor-today.com/news_items/2018/jun/lehigh_070618.shtml)



9. "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](https://www.eurekalert.org/pub_releases/2018-02/lu-tbo022218.php)
10. "Lessons on Laser Diodes" Architectural Lighting Technology, Nov. 27, 2017. [http://www.archlighting.com/technology/lessons-on-laser-diodes\\_o](http://www.archlighting.com/technology/lessons-on-laser-diodes_o)
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18. "Quantum Dots Could Lead to Ultra-Efficient Solid-State Lighting Sources," AZOquantum, Jan 4, 2017. <http://www.azoquantum.com/News.aspx?newsID=5147>
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<http://www.ledsmagazine.com/articles/2009/03/photonic-crystal-led-reaches-73-light-extraction-efficiency.html>

## Honors/Awards

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- 2024, Optica Fellow
- 2019, Senior Member of Optica (formerly OSA)
- 2018, Joel and Ruth Spira Excellence in Teaching Award / Lutron Electronics Co.
- 2014, Honorary Member of Illumination Engineering Society (IES)
- 2012, R&D100 Award, "Photovoltaics that fit," R&D Magazine
- 2011, Senior Member of the Institute of Electrical and Electronics Engineers (IEEE)
- 2004, R&D100 Award, "Cantilever Epitaxy and Growth of Low-Dislocation Gallium Nitride," R&D Magazine
- 1998, Gregory Stillman Semiconductor Research Award

## Societies

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- Institute of Electrical and Electronics Engineers (IEEE): Senior Member 2011-present, Member 1998-2011.
- Optica (formerly OSA): Fellow 2024-present, Senior Member 2019-2024, Member 2011-2019.
- Illuminating Engineering Society (IES): Member 2014-2020.
- Society of Photographic Instrumentation Engineers (SPIE): Member 2016-2020.
- Sigma Xi, 2020

## 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.
- Electronic Materials Conference, Organizer, Group III-Nitrides: Growth, Processing, Characterization, Theory and Devices, 2015-2023.
- International Workshop on Nitride Semiconductors, Proceedings Committee, 2016.

- Light-Emitting Diodes and their Industrial Applications (LEDIA), Program Committee, 2016-2020.
- Lester Eastman Conference, Program Committee, 2016, 2018, 2021, and 2023.
- International Workshop of Nitride Semiconductors (IWN), Program Committee Optical Devices, 2016, 2018, 2022, 2024.
- International Conference on Nitride Semiconductors (ICNS), Program Committee, 2021, 2023.
- IEEE Photonics Conference (IPC), Technical Program Committee, 2022.

## Journal Activities

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- Senior Editor, IEEE Photonics Technology Letters, June 2022-present.
- Associate Editor, IEEE Photonics Technology Letters, Jan. 2018-June 2022.
- Associate Editor, IEEE Journal of Quantum Electronics, Jan. 2024-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 Electron Devices 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, Nanomaterials, 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, quantum mechanics, semiconductor lasers and LEDs, photonic crystals, power electronic devices, solid-state physics, applied quantum mechanics, semiconductor device simulation, electromagnetics, photovoltaics and photodetectors, semiconductor device processing, patents, and intellectual property.

### Courses at San Jose State University

- 2000 Fall MatE 153

### Courses at Lehigh University

- 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
  - 2019 Fall ECE 350/450 Semiconductor Optoelectronics
  - 2020 Spring ECE 126 Fundamentals of Semiconductor Devices  
ECE 308 Physics and Models of Semiconductor Devices
  - 2020 Fall ECE 350/450 Semiconductor Optoelectronics
  - 2021 Spring ECE 126 Fundamentals of Semiconductor Devices  
ECE 308 Physics and Models of Semiconductor Devices

### Courses at North Carolina State University

- 2021 Fall ECE 492/592 Semiconductor Optoelectronic Devices
- 2022 Fall ECE 492/592 Semiconductor Optoelectronic Devices
- 2022 Fall ECE 592 Semiconductor Optoelectronic Devices
- 2023 Spring ECE 592 Laser Diodes and Photonic Integrated Circuits
- 2023 Fall ECE 592 Semiconductor Optoelectronic Devices
- 2024 Spring ECE 792 Wide Bandgap Semiconductor Fabrication and Technology
- 2024 Fall ECE 529 Semiconductor Optoelectronic Devices

### Course evaluation scores at Lehigh University, Fall 2015-Spring 2018

Semester	Course Number	Course Credits	Enrollment	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 at Lehigh University, Spring 2018-Spring 2021

Semester	Course Number	Course Credits	Enrollment	Mean Quest 1	Mean Ques 2	Mean Ques 3	Mean Ques 4	Mean Ques 5	Mean Ques 6
Fall 2018	ECE 350/450	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
Fall 2019	ECE 350/450	3	7	5	5	5	5	5	5
Spring 2020	ECE 126	3	11	NA	NA	NA	NA	NA	NA
Spring 2020	ECE 308	3	6	NA	NA	NA	NA	NA	NA
Fall 2020	ECE 350/450	3	6	NA	NA	NA	NA	NA	NA
Spring 2021	ECE 126	3	29	4.75	4.69	4.63	4.25	4.5	4.94
Spring 2021	ECE 308	3	9	4.86	4.71	4.71	4.86	5	4.71

Notes: Spring 2020 and Fall 2020 scores were not given due to online learning/ COVID-19.

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

*Q1: Instructor presented content in an organized manner.*

*Q2: The instructor's teaching methods contributed to my understanding of the course material.*

*Q3: The instructor was responsive when I had difficulties or questions.*

*Q4: The instructor gave me constructive feedback.*

*Q5: The instructor's assignments provided opportunities for participative learning within the course.*

*Q6: The course increased my knowledge of the subject matter.*

### Course evaluation scores at NC State University, Fall 2021-present.

Semester	Course Number	Course Credits	Enrollment	Mean Quest 1	Mean Ques 2	Mean Ques 3	Mean Ques 8	Mean Ques 11
Fall 2021	ECE 492/592	3	8	NA	NA	NA	NA	NA
Fall 2022	ECE 492/592	3	6	5	5	4.7	5	5
Spring 2023	ECE 592	3	11	4.8	4.8	4	4.2	4.4
Fall 2023	ECE 592	3	7	5	5	5	5	5
Spring 2024*	ECE 792	3	12	TBD	TBD	TBD	TBD	TBD

\* Co-taught

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

*Q1. The instructors teaching aligned with the courses learning objectives/ outcomes.*

*Q2. The instructor was receptive to students outside the classroom.*

*Q3 The instructor explained material well.*

*Q8 Overall, the instructor was an effective teacher.*

*Q11 This course improved my knowledge of the subject.*

## Advising

### Current Ph.D. research students:

1. Elia Palmese  
Research topic/Thesis: "III-nitride power transistors"  
Duration: Sept 2019 - present
2. Haotian Xue  
Research topic: "III-nitride growth of emitters and power devices"  
Duration: Jan 2021 – present
3. Daniel Rogers  
Research topic: "Efficient red III-nitride emitters"  
Duration: Sept 2020 – present
4. Dakota Gray-Boneker  
Duration: Sept 2022-present
5. Antonio Gonzalez  
Research topic/Thesis: "III-Nitride growth"  
Duration: Sept 2023-present
6. Swagata Goswami Utsha  
Research topic/Thesis: "III-Nitrides"  
Duration: Sept 2023-present

**Ph.D. students supervised:**

1. Matt Peart  
Research topic/Thesis: “Development of III-Nitride Power Device Technology”  
Duration: June 2016 - Aug 2020  
Placement: Magneton, Inc.  
Current Employment: Princeton Infrared Technologies
2. Syed Ahmed Al Mueeed  
Research topic/Thesis: “III-Nitride interlayer active region light emitters in the visible range”  
Duration: Sept 2016 - May 2021  
Placement: Raxium, Inc.  
Current Employment: Google, Inc.
3. Xiongliang Wei  
Research topic/Thesis: “InGaN Quantum Dots for Efficient Light Emitters”  
Duration: June 2016 - Aug 2021  
Placement: Hisense Photonics

**PhD student advisory:**

1. Onoriode Ogidi-Ekoko (Advisory role only)  
Research topic: “Oxide films on GaN”  
Duration: Jan 2021-Aug 2021
2. Hanlin Fu (Advisory role only)  
Research topic: “Growth of AlInN films”  
Duration: Jan 2021- Aug 2021

**Master’s student supervised:**

1. Matt Peart  
Research topic/Thesis: “The Faraday Effect in Gallium Nitride”  
Duration: Sept 2015-May 2016  
Placement: PhD student in my group
1. Xiongliang Wei  
Research topic (no thesis): “Quantum Dot Etching”  
Duration: Sept 2015-May 2016  
Placement: PhD student in my group
2. Siyuan Guo  
Research topic: “III-nitride Photonic Integrated Circuits”  
Duration: Sept 2019- May 2020
4. Jing Xue  
Research topic: “Frequency response of micro-LEDs”  
Duration: Jan 2020- Jan 2021
5. Dakota Gray-Boneker

Duration: Sept 2022-Dec 2002  
Placement: Converted to Ph.D. at NCSU

**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.
5. Mark Schafer  
Research topic: Optical gain measurements  
Duration: Fall 2019-Spring 2020  
Placement: M.S. student Lehigh
6. Chengxin Yu  
Duration: Summer 2019 – Summer 2020  
Placement: M.S. student at Univ. of Mich.
7. Sydney Wisniewski  
Duration: Summer 2019 – Spring 2020  
Placement: M.S. student at KU Leuven, Belgium
8. Geethu Alluri  
Duration: Sept 2022-May 2023  
Topic: MOCVD recipe converter  
Placement: MS NCSU

**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: FLIR Systems



**Visiting researchers supervised:**

1. Elly Tsai  
Research topic: Light extraction in nanowire LEDs.  
Duration: Sept 2016-Oct 2017  
Placement: glo-USA  
Current employment: Google/Raxium
2. Justin Goodrich  
Research topic: “AllInN materials.”  
Duration: Mar 2021-Aug 2021
3. Jing Xue  
Research topic: “Frequency response of micro-LEDs.”  
Duration: Jan 2021-Aug 2021

**Ph.D. committee member, NC State**

1. Ujjwal Pratik (Advisor: Zeljko Pantic)
2. Joshua Larson (Advisor: Michael Kudenov)
3. Mas Hakimi Heris (Advisor: Dima Farfunik)

**Ph.D. committee member, Lehigh**

1. Wei Sun
2. Damir Borovac
3. Ioannis Fragkos
4. Le Zhao
5. Zhao Dong
6. Jason Jerwick
7. Ji Chen
8. Liang Gao
9. Yuan Jin
10. Onoriode Ogidi-Ekoko
11. Hanlin Fu
12. Justin Goodrich

**Service to the University**

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- NCSU ECE department, ECE Faculty Search Committee, 2022-present.
- Lehigh University, Internal Review Committee, Fall 2019-Aug 2021.
- Lehigh University, Graduate Research Council, 2018.
- Lehigh ECE department, Faculty Diversity Hiring Committee, Spring 2021
- Lehigh ECE department, Graduate Liaison for Masters in Photonics program, Spring 2020- Aug 2021
- Lehigh ECE department, Graduate student committee, Aug 2015 - Aug 2021

Jonathan J. Wierer, Jr.

- Lehigh ECE department, Seminar speaker committee, Aug 2015 - Aug 2021
- Lehigh ECE department, Lehigh ECE 125<sup>th</sup> Anniversary committee, 2017-2018
- Lehigh Center for Photonics and Nanoelectronics, Member, Aug 2015 - Aug 2021
- Lehigh Center for Photonics and Nanoelectronics, Nanofabrication Facilities Committee, 2017 - Aug 2021