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Contact Information

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Date of Birth & Citizenship

November 8th, 1987, China.

Education

Jan. 2014 – Present ***Lehigh University (Bethlehem, Pennsylvania, USA)***
Ph.D. Candidate in Electrical Engineering, Department of Electrical and Computer Engineering, P. C. Rossin College of Engineering and Applied Science.
- Ph.D. Advisor: Prof. Nelson Tansu
- Thesis: Band structure engineering and material synthesis in nano-scale III-Nitride

Aug. 2012 – Aug. 2014 ***Lehigh University (Bethlehem, Pennsylvania, USA)***
Master of Business & Engr. (MBA&E) in Business Administration & Electrical Engineering, College of Business & Economics and P.C. Rossin College of Engineering & Applied Science.

Mar. 2009 – Jul. 2009 ***ESIEE à Amiens (Amiens, France)***
Exchanged senior designing program in Department of Electronics and Electrical Engineering.

Sep. 2005 – Jul. 2009 ***Beijing Institute of Technology (Beijing, China)***
Bachelor of Engineering (B.Engr.) in Electrical & Information Engineering, Department of Electrical Engineering, School of Information and Electronics.

Professional Experiences

Sep. 2014 – Present ***Lehigh University (Bethlehem, Pennsylvania, USA)***
Research Assistant in Center for Photonics and Nanoelectronics (CPN); P. C. Rossin College of Engineering and Applied Science;
- Developing and optimizing the MOCVD epitaxy for InGaN-based MQW with Al-containing (AlGaN, AlInN) interlayer, AlInN wide bandgap semiconductor, and III-Nitride ultra-thin superlattice digital alloys;
- Characterization of III-Nitride material, active regions, and devices, including hall, x-ray diffraction, atomic force microscope, photoluminescence, and electroluminescence, etc.
- Developing numerical modeling tool for the study of III-Nitride ultra-thin superlattice digital alloys;
- Well-versed in operation, maintenance, research and development by using Veeco P-75 MOCVD reactor in CPN, Lehigh University;

Aug. 2009 – Apr.2011 ***AVIC LETRI (Wuxi, Jiangsu, China)***
Assistant System Engineer in Joint System Research & Development Group
- System development of commercial Integrated Surveillance System for Comac C919 narrow-body twinjet airliner (Cooperating with **Rockwell Collins, Inc.**, USA);

- Contributing to the founding of the Joint Venture - AVIC Leihua Rockwell Collins Avionics Company.

Research Interests

His research is related to III-Nitride semiconductor nanostructures and technologies for solid-state lighting and other optoelectronic applications. The research works accomplished during his PhD study cover various aspects of the theoretical/experimental physics, MOCVD epitaxy and characterization of III-Nitride semiconductor material, active region, and devices.

Leadership

2016-2018, SPIE Lehigh University Student Chapter (President)

Awards & Honors Received

- Packard Fellowship (January 2016 – June 2016), Lehigh University
- Lehigh University Research Assistantship (September 2015 – present), Lehigh University
- Lehigh University Dean's Assistantship (September 2014 – August 2015), Lehigh University

Professional Affiliations

2014 – present, Student Member, International Society for Optical Engineering (SPIE)
2015 – present, Student Member, American Physical Society (APS)

Journal Publications

1. P. F. Zhu, C. K. Tan, **W. Sun**, and N. Tansu, "Aspect Ratio Engineering of Microlens Arrays in Thin-Film Flip-Chip Light-Emitting Diodes," Applied Optics, vol. 54, pp. 10299-10303, October 2015.
2. C. K. Tan, D. Borovac, **W. Sun**, and N. Tansu, "InGaN/Dilute-As GaNAs Interface Quantum Well for Red Emitters," Scientific Reports, vol. 6, Art. 19271, January 2016.
3. C. K. Tan, D. Borovac, **W. Sun**, and N. Tansu, "Dilute-As AlNAs Alloy for Deep-Ultraviolet Emitter," Scientific Reports, vol. 6, Art. 22215, February 2016.
4. C. K. Tan, **W. Sun**, D. Borovac, and N. Tansu, "Large Optical Gain AlInN-Delta-GaN Quantum Well for Deep Ultraviolet Emitters," Scientific Reports, vol. 6, Art. 22983, March 2016.
5. P. F. Zhu, H. Zhu, W. Qin, B. H. Dantas, **W. Sun**, C. K. Tan, and N. Tansu, "Narrow-Linewidth Red-Emission Eu3+-Doped TiO2 Spheres for Light-Emitting Diodes", Journal of Applied Physics, vol. 119, Art. 124305, March 2016.
6. C. K. Tan, D. Borovac, **W. Sun**, and N. Tansu, "First-Principle Electronic Properties of Dilute-P GaN1-xPx Alloy for Visible Light Emitters", Scientific Reports, vol. 6, Art. 24412, April 2016.
7. 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, vol. 7, no. 3, Art. 035212, March 2017.
8. **W. Sun**, C. K. Tan, and N. Tansu, "III-Nitride Digital Alloy: Electronics and Optoelectronics Properties of the InN/GaN Ultra-Short Period Superlattice Nanostructures", Scientific Reports, vol. 7, Art. 6671, July 2017.
9. **W. Sun**, C. K. Tan, and N. Tansu, "AlN/GaN Digital Alloy for Mid- and Deep-Ultraviolet Optoelectronics", Scientific Reports, vol. 7, Art. 11826, September 2017.
10. S. A. Al Muyeed, **W. Sun**, X. Wei, R. Song, D. D. Koleske, N. Tansu, and J. J. Wierer, Jr., "Strain compensation in InGaN-based multiple quantum wells using AlGaN interlayers", AIP Advances, vol. 7, no. 10, Art. 105312, October 2017.
11. G. Zeng, **W. Sun**, R. Song, N. Tansu, and B. Krick, "Crystal Orientation Dependence of Gallium Nitride Wear", Scientific Reports, vol. 7, Art. 14126, October 2017.
12. **W. Sun**, C. K. Tan, J. J. Wierer, Jr., and N. Tansu, "Ultra-Broadband Optical Gain in III-Nitride Digital Alloys", Scientific Reports, vol. 8, Art. 3109, February 2018.
13. **W. Sun**, S. A. Al Muyeed, R. Song, J. J. Wierer, Jr., and N. Tansu, "Integrating AlInN interlayers into InGaN/GaN multiple quantum wells for enhanced green emission", Applied Physics Letters, vol. 112, Art. 201106, May 2018.

14. X. Wei, S. A. Al Muyeed, M. R. Peart, **W. Sun**, N. Tansu, and J. J. Wierer, Jr., "Room temperature luminescence of passivated InGaN quantum dots formed by quantum-sized-controlled photoelectrochemical etching", Applied Physics Letters, vol. 113, Art. 121106, Sep 2018.
15. **W. Sun**, H. Kim, L. Mawst, and N. Tansu, "Interplay of GaAsP Barrier and Strain Compensation in InGaAs Quantum Well at Near-Critical Thickness", submitted.

Conference Publications

1. **(Invited Conference Paper)** P. F. Zhu, **W. Sun**, C. K. Tan, and N. Tansu, "Light Extraction Efficiency Enhancement in GaN-Based LEDs with Self-Assembly Approach," Proc. of the Progress in Electromagnetics Research Symposium (PIERS) 2014, Guangzhou, China, August 2014.
2. **(Invited Keynote Conference Paper)** N. Tansu, C. K. Tan, P. F. Zhu, and **W. Sun**, "Physics of High Efficiency and Efficiency-Droop in III-Nitride Light-Emitting Diodes," Proc. of the Progress in Electromagnetics Research Symposium (PIERS) 2014, Guangzhou, China, August 2014.
3. **W. Sun**, C. K. Tan, and N. Tansu, "Artificially-Engineered III-Nitride Digital Alloy for Solar Energy Harvesting," Proc. of the American Physical Society (APS) Annual March Meeting 2015, San Antonio, Texas, USA, March 2015.
4. **W. Sun**, C. K. Tan, and N. Tansu, "Physics of Artificially-Engineered AlGaN and InGaN Based Digital Alloys," Proc. of the SPIE Optics + Photonics 2015, Low Dimensional Materials and Devices, San Diego, CA, August 2015.
5. **W. Sun**, C. K. Tan, and N. Tansu, "Artificially Engineered InGaN-Based Digital Alloy for Optoelectronics", Proc. of the IEEE Photonics Conference (IPC) 2015, Arlington, VA, October 2015.
6. **W. Sun**, C. K. Tan, and N. Tansu, "AlGaN digital alloys for deep-ultraviolet application", Proc. of the SPIE Photonics West 2016, Physics and Simulation of Optoelectronic Devices XXIV, San Francisco, CA, Feb 2016.
7. **(Invited – Student Award Winner)** C. K. Tan, **W. Sun**, D. Borovac, J. J. Wierer, Jr., and N. Tansu, "InGaN-GaNAs 'Interface Quantum Well' for Long-Wavelength Emission", DOE R&D Workshop on Solid State Lighting 2016, Raleigh, NC, USA, February 2016.
8. **W. Sun**, C. K. Tan, J. J. Wierer, Jr., and N. Tansu, "Miniband Engineering in III-Nitride Digital Alloy for Broadband Device Applications", Proc. of the IEEE Lester Eastman Conference on High Performance Devices 2016, Bethlehem, PA, August 2016.
9. C. K. Tan, **W. Sun**, D. Borovac, J. J. Wierer, and N. Tansu, "Electronics Properties of Dilute-Anion III-Nitride Semiconductors for Light Emitters", Proc. of the IEEE Lester Eastman Conference on High Performance Devices 2016, Bethlehem, PA, August 2016.
10. C. K. Tan, **W. Sun**, D. Borovac, J. J. Wierer, and N. Tansu, "How Can Dilute-Anion III-Nitride Be Used for Light Emitters?", Proc. of the International Workshop on Nitride Semiconductors 2016 (IWN 2016), Orlando, FL, October 2016.
11. C. K. Tan, **W. Sun**, D. Borovac, J. J. Wierer, and N. Tansu, "Dilute-anion III-nitride: A potential visible light emitter", Proc. of the IEEE Photonics Conference (IPC) 2016, Waikoloa, HI, October 2016.
12. C. K. Tan, **W. Sun**, J. J. Wierer, and N. Tansu, "How the interface affects Auger process in quantum wells", Proc. of the SPIE Photonics West 2017, Novel In-Plane Semiconductor Lasers XVI, San Francisco, CA, Jan 2017.
13. Y. Huang, **W. Sun**, L. Yan, A. Nitkowski, A, Weinroth, N. Tansu, and C. Zhou, "Improved ultrahigh-speed space-division multiplexing optical coherence tomography with integrated photonic devices", Proc. of the SPIE Photonics West 2017, Optical Coherence Tomography and Coherence Domain Optical Methods in Biomedicine XXI, San Francisco, CA, Jan 2017.
14. **W. Sun**, C. K. Tan, J. J. Wierer, and N. Tansu, "Ultra-broadband III-nitride digital alloys active region for optoelectronic applications", Proc. of the SPIE Photonics West 2017, Physics and Simulation of Optoelectronic Devices XXV, San Francisco, CA, Jan 2017.
15. S. A. A. Muyeed, **W. Sun**, X. Wei, R. Song, N. Tansu, J. J. Wierer, Jr., and D. Koleske, "Strain balancing in InGaN-based multiple quantum wells using AlGaN interlayers", Proc. of the TMS Electronics Material Conference (EMC) 2017, South Bend, IN, June 2017.

16. **W. Sun**, G. Zeng, R. Song, J. J. Wierer, Jr., and N. Tansu, "Strain Relaxation Properties of OMVPE-Grown AlInN Semiconductors", Proc. of the 21st American Conference on Crystal Growth and Epitaxy, Santa Fe, NM, July 2017.
17. I. E. Fragkos, **W. Sun**, D. Borovac, R. Song, J. J. Wierer, Jr., and N. Tansu, "Pulsed OMVPE Growth Studies of InN for Integration in InGaN Active Region", Proc. of the 21st American Conference on Crystal Growth and Epitaxy 2017, Santa Fe, NM, July 2017.
18. **(Invited Conference Paper)** N. Tansu, J. J. Wierer, Jr., C. K. Tan, and **W. Sun**, "Next Generation III-Nitride Materials and Research – from Photonics to New Applications", IEEE / OSA Conference on Lasers and Electro-Optics (CLEO) Pacific 2017, Singapore, Republic of Singapore, July / August 2017.
19. **(Invited Conference Paper)** J. J. Wierer, Jr., X. Wei, S. A. Al Muyeed, **W. Sun**, R. Song, and N. Tansu, "Routes to ultra-efficient III-nitride emitters for solid-state lighting" 11th International Symposium on Semiconductor Light Emitting Devices 2017, Banff, Canada, October 2017.
20. **(Invited Conference Paper)** 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 SPIE Optics + Photonics 2017, The 16th International Conference on Solid State Lighting, San Diego, CA, August 2017.
21. **W. Sun**, C. K. Tan, and N. Tansu, "Lattice-matched AlInN/GaN Digital Alloy for Mid- and Deep-Ultraviolet Applications", Proc. of the IEEE Photonics Conference (IPC) 2017, Orlando, FL, October 2017.
22. C. K. Tan, D. Borovac, **W. Sun**, and N. Tansu, "Dilute-Anion Boron Nitride Semiconductor for Light Emitters", Proc. of the IEEE Photonics Conference 2017, Orlando, FL, October 2017.
23. **(Invited Conference Paper)** 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, Boulder, CO, USA, November 2017.
24. **W. Sun**, C. K. Tan, and N. Tansu, "Valence Subband Engineering of AlInN/GaN Digital Alloy for Polarization-Insensitive Applications in Mid- and Deep-UV Regime", Proc. of the SPIE Photonics West 2018, Physics and Simulation of Optoelectronic Devices XXVI, San Francisco, CA, Jan 2018.
25. **W. Sun**, D. Borovac, C. K. Tan, and N. Tansu, "Characteristics of Dilute-As InGaNAs Quantum Wells for Laser Active Regions", Proc. of the SPIE Photonics West 2018, Novel In-Plane Semiconductor Lasers XVII, San Francisco, CA, Jan 2018.
26. I. Fragkos, **W. Sun**, and N. Tansu, "Analysis of asymmetric InGaN-Delta-InN/AlGaN quantum wells with GaN barriers for LEDs", Proc. of the SPIE Photonics West 2018, Light-Emitting Diodes: Materials, Devices, and Applications for Solid State Lighting XXII, San Francisco, CA, Jan 2018.
27. I. Fragkos, **W. Sun**, R. Song, and N. Tansu, "Pulse-MOCVD growth of InN / AlGaN delta-layer active region for long wavelength emitters", Proc. of the SPIE Photonics West 2018, Gallium Nitride Materials and Devices XIII, San Francisco, CA, Jan 2018.
28. D. Borovac, **W. Sun**, C. K. Tan, and N. Tansu, "Electronic Properties of the Dilute-As InGaNAs Alloy by using First-Principle Calculations", Proc. of the SPIE Photonics West 2018, Gallium Nitride Materials and Devices XIII, San Francisco, CA, Jan 2018.
29. A. M. Slosberg, **W. Sun**, O. N. Ogidi-Ekoko, and N. Tansu, "Characteristics of GaN-Based Subwavelength Gratings for III-Nitride VCSELs", Proc. of the SPIE Photonics West 2018, Vertical-Cavity Surface-Emitting Lasers XXII, San Francisco, CA, Jan 2018.
30. **W. Sun**, H. Kim, L. J. Mawst, and N. Tansu, "Strain relaxation and compensation in InGaAs quantum wells at near critical thickness", Proc. of the 19th International Conference on Metalorganic Vapor Phase Epitaxy, Nara, Japan, Jun 2018.
31. H. L. Fu, **W. Sun**, O. N. Ogidi-Ekoko, and N. Tansu, "Gain Properties of InGaN Quantum Wells with AlGaInN Barriers", Proc. of the IEEE Photonics Conference 2018, Reston, VA, October 2018.
32. 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", Proc. of the IEEE Photonics Conference 2018, Reston, VA, October 2018.
33. **W. Sun**, H. Kim, L. J. Mawst, and N. Tansu, "Interplay of strain compensation and relaxation in high-performance InGaAs quantum well lasers", Proc. of the IEEE Photonics Conference 2018, Reston, VA, October 2018.

34. 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”, Proc. of the IEEE Photonics Conference 2018, Reston, VA, October 2018.
35. D. Borovac, **W. Sun**, C.-K. Tan, and N. Tansu, "Dilute-As InGaNAs Quantum Wells for Red-Emitting Lasers", Proc. of the IEEE Photonics Conference 2018, Reston, VA, October 2018.
36. C. K. Tan, D. Borovac, **W. Sun**, and N. Tansu, “InGaN-GaNAs Interface Quantum Well with AlGaN Interlayer for Amber-Red Emitters”, Proc. of the IEEE Photonics Conference 2018, Reston, VA, October 2018.

Educational Services

1. ***Conference University Exhibitor***, IEEE Photonics Conference 2015, Reston, VA, October 2015
2. ***First-year Undergraduate Student Panel,*** ECE, Lehigh University, Bethlehem, PA, March 2017

Journal Reviewing

1. ***Journal of Photonics for Energy*** (published by SPIE)
2. ***IEEE/OSA Journal of Display Technology*** (published by IEEE / OSA)
3. ***ACS Photonics*** (published by ACS)

References

1. Prof. Nelson Tansu (Ph.D. Advisor)
   Daniel E. '39 and Patricia M. Smith Endowed Chair Professor in Photonics and Nanoelectronics
   Smith Family Endowed Director, Center for Photonics and Nanoelectronics (CPN)
   Department of Electrical and Computer Engineering (ECE)
   P. C. Rossin College of Engineering and Applied Science
   Lehigh University
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   Research Group: www.ece.lehigh.edu/~tansu
   CPN Web: http://www.lehigh.edu/~incpn

2. Prof. Jonathan J. Wierer
   Associate Professor
   Center for Photonics and Nanoelectronics (CPN)
   Department of Electrical and Computer Engineering (ECE)
   P. C. Rossin College of Engineering and Applied Science
   Lehigh University
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3. Prof. Luke J. Mawst
   Professor
   Reed Center for Photonics
   Department of Electrical and Computer Engineering (ECE)
   College of Engineering
   University of Wisconsin-Madison
   Madison, WI 53706, USA
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