

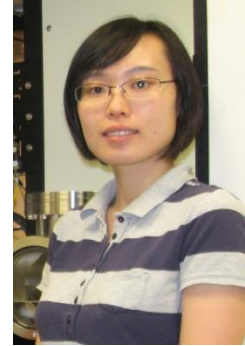
7 ASA Drive • Bethlehem, PA 18015 • USA
Cell Phone: (908) 209-2239 • Fax (610) 758-2605 • E-mail: Gul308@Lehigh.Edu

(Ms.) Guangyu Liu, Ph.D.

Information updated up to: **May 2013**

Contact Information

(Ms.) Guangyu Liu, Ph.D.
Postdoctoral Research Fellow
Center for Photonics and Nanoelectronics
Department of Electrical and Computer Engineering
Lehigh University
7 Asa Drive, Bethlehem, PA 18015, USA
Email: Gul308@Lehigh.Edu; Cell Phone: (908) 209-2239, Fax: (610) 758-2605
Research Group: www.ece.lehigh.edu/~tansu



Birth Date and Place & Citizenship

February 21st 1987, Changsha, Hunan Province, China & Chinese

Education

July 2008 – May 2013, Lehigh University (Bethlehem, Pennsylvania, USA)

Doctor of Philosophy (Ph.D.) in Electrical Engineering, Department of Electrical and Computer Engineering

- Research Assistant, PhD Advisor: Prof. Nelson Tansu (ECE, Lehigh)
- Dissertation Title: “Device Engineering for Internal Quantum Efficiency Enhancement and Efficiency Droop Issue in III-Nitride Light-Emitting Diodes”
- Research Areas: physics of III-Nitride semiconductor optoelectronics materials and devices, physics of III-Nitride semiconductor nanostructures for sustainable energy applications.

Sep. 2004 – Jul. 2008, Huazhong University of Science and Technology (Wuhan, China)

Bachelor of Science (B.S.) in Electronic Science and Technology

- Thesis: “Fabrication of Nano-Magnetic Films and Influence of Film Microstructure to Microwave Properties”
- Award: “Best Graduation Thesis”

Professional Experiences

May 2013 – Present, Lehigh University (Bethlehem, PA, USA)

Postdoctoral Research Fellow

Department of Electrical and Computer Engineering (ECE)
P. C. Rossin College of Engineering and Applied Science & Center for Optical Technologies (COT)
Advisor: Prof. Nelson Tansu

Spring 2012, Fall 2012, Spring 2013 Lehigh University (Bethlehem, Pennsylvania, USA)

Substitute Lecturer

ECE 203: Engineering Electromagnetics (Junior UG level) – Spring 2012 and Spring 2013

ECE 451: Physics of Semiconductors and Nanostructures (Graduate Level) – Fall 2012

Department of Electrical and Computer Engineering,
P. C. Rossin College of Engineering and Applied Science

July 2008 – May 2013, Lehigh University (Bethlehem, PA, USA)

Ph.D. Candidate and Research Assistant

Department of Electrical and Computer Engineering (ECE)
P. C. Rossin College of Engineering and Applied Science & Center for Optical Technologies (COT)
Ph.D. Advisor: Prof. Nelson Tansu

Research Interests

My research interests are related to III-Nitride semiconductor nanostructures and optoelectronics devices for sustainable energy applications, covering the theoretical / computational analysis, metalorganic chemical vapor deposition (MOCVD) growth, and device fabrication and characterization technology. The research topics include the pursuit of high performance green light-emitting diodes (LEDs), novel quantum structures for high power III-Nitride LEDs with low cost, and the growths of III-Nitride quantum dots (QDs) devices for solid state lighting and solar cells.

Awards & Honors Received

- **2013 Rossin Doctoral Fellowship**, Lehigh University
- **SPIE Scholarship in Optics and Photonics** (2012), SPIE
- **Sherman-Fairchild Fellowship for Solid State Studies** (2012-2013), Lehigh University
- **Sherman-Fairchild Fellowship for Solid State Studies** (2009-2010), Lehigh University
- **Lehigh University Research Assistantship** (July. 2008- present), Lehigh University
- **Lehigh University Dean's Scholarship** (July. 2008- July 2009), Lehigh University
- **Best Graduation Thesis** (June, 2008), Huazhong University of Science and Technology
- **Award of Excellent Student of HUST** (2004-2007), Huazhong University of Science and Technology
- **Scholarships for Excellence in Study** (2004-2007), Huazhong University of Science and Technology

Professional Affiliations

- 2008 – present, Member, Institute of Electrical and Electronics Engineers (IEEE)
- 2008 – present, Member, IEEE Photonics Society
- 2008 – present, Member, International Society for Optical Engineering (SPIE)
- 2008 – present, Member, Optical Society of America (OSA)

Refereed Journal and Conference Publications

Publication Name Search in ISI Web of Knowledge: (Liu GY and Tansu)

ISI Web of Knowledge Record (as of May 21st, 2013): Total Citations = 596; h-index = 11

Total Refereed Journal Publications: 22; Total First Authorship Refereed Publications: 13

1. **(Invited Conference Paper)** N. Tansu, H. P. Zhao, R. A. Arif, Y. K. Ee, **G. Y. Liu**, X. H. Li, and G. S. Huang, "Polarization Engineering of InGaN-Based Nanostructures for Low-Threshold Diode Lasers and High-Efficiency Light Emitting Diodes," in *Proc. of the IEEE Photonics Global 2008, Nanophotonics Symposium*, Singapore, Republic of Singapore, December 2008
2. H. P. Zhao, **G. Y. Liu**, X. Li, G. Huang, S. Tafon Penn, V. Dierolf and N. Tansu, "Growths of Staggered InGaN Quantum Wells Light-Emitting Diodes Emitting at 520-525 nm Employing Graded-Temperature Profile," in *Proc. of SPIE Photonic West 2009*, vol. 7231, Art. 72310E, San Jose, CA, January 2009.
3. H. P. Zhao, M. Jamil, **G. Y. Liu**, G. S. Huang, H. Tong, G. Xu, Y. J. Ding, N. Tansu, "Pulsed Metalorganic Vapor Phase Epitaxy of In-Polar and N-Polar InN Semiconductors on GaN / Sapphire Templates for Terahertz Emitters," *Proc. IEEE/OSA Conference on Lasers and Electro-Optics (CLEO) 2009*, Baltimore, MD, May 2009.
4. H. P. Zhao, **G. Y. Liu**, X. Li, G. S. Huang, S. Tafon Penn, V. Dierolf, and N. Tansu, "Staggered InGaN Quantum Wells Light-Emitting Diodes at 520-nm Employing Graded Temperature Growths," in *Proc. of the IEEE/OSA Conference on Lasers and Electro-Optics (CLEO) 2009*, Baltimore, MD, May 2009.
5. G. Sun, S. K. Tripathy, Y. J. Ding, **G. Y. Liu**, G. S. Huang, H. P. Zhao, N. Tansu, and J. B. Khurgin, "Stark Effect Induced by Photogenerated Carriers in Multiple GaN/AlN Asymmetric Coupled Quantum Wells," in *Proc. of the IEEE/OSA Conference on Lasers and Electro-Optics (CLEO) 2009*, Baltimore, MD, May 2009
6. H. P. Zhao, G. S. Huang, **G. Y. Liu**, X. H. Li, J. D. Poplawsky, S. Tafon Penn, V. Dierolf, and N. Tansu, "Characteristics of Staggered InGaN Quantum Wells Light-Emitting Diodes Emitting at 480-525 nm," in *Proc. of the 67th IEEE Device Research Conference (DRC) 2009*, University Park, PA, June 2009.
7. H. P. Zhao, **G. Y. Liu**, X. H. Li, G. S. Huang, J. D. Poplawsky, S. Tafon Penn, V. Dierolf, and N. Tansu, "Growths of Staggered InGaN Quantum Wells Light-Emitting Diodes Emitting at 520-525 nm Employing Graded Growth-Temperature Profile," *Appl. Phys. Lett.*, vol. 95(6), Art. 061104, August 2009

8. H. P. Zhao, **G. Y. Liu**, R. A. Arif, and N. Tansu, "Effect of Current Injection Efficiency on Efficiency-Droop in InGaN Quantum Well Light-Emitting Diodes," in *Proc. of the IEEE International Semiconductor Device Research Symposium (ISDRS) 2009*, College Park, MD, Nov 2009.
9. **(Invited Journal Paper)** H. P. Zhao, **G. Y. Liu**, X. H. Li, R. A. Arif, G. S. Huang, J. D. Poplawsky, S. Tafon Penn, V. Dierolf, and N. Tansu, "Design and Characteristics of Staggered InGaN Quantum Well Light-Emitting Diodes in the Green Spectral Regimes," *IET Optoelectronics*, vol. 3(6), pp. 283-295, December 2009.
10. **(Invited Conference Paper)** N. Tansu, H. P. Zhao, R. A. Arif, Y. K. Ee, **G. Y. Liu**, X. H. Li, H. Tong, and G. S. Huang, "Novel Approaches for Efficiency Enhancement in InGaN-Based Light-Emitting Diodes," in *Proc. of the 2nd International Conference on White LEDs and Solid State Lighting 2009*, Taipei, Taiwan, December 2009
11. **(Invited Conference Paper)** N. Tansu, H. P. Zhao, Y. K. Ee, **G. Y. Liu**, X. H. Li, and G. S. Huang, "Novel Device Concept for High-Efficiency InGaN Quantum Wells Light-Emitting Diodes," in *Proc. of the SPIE Photonics West 2010*, Gallium Nitride Materials and Devices V, San Francisco, CA, Jan 2010
12. **G. Y. Liu**, H. Zhao, and N. Tansu, "Electron-Phonon and Electron-Photon Intersubband Scattering Rates in Asymmetric AlN / GaN Coupled Quantum Wells," in *Proc. of the SPIE Photonics West 2010*, Physics and Simulation of Optoelectronics Devices XVIII, San Francisco, CA, Jan 2010.
13. H. Tong, J. A. Herbsommer, V. A. Handara, H. Zhao, **G. Y. Liu**, and N. Tansu, "Thermal Conductivity Measurement of Pulsed-MOVPE InN Alloy Grown on GaN / Sapphire by 3ω Method," in *Proc. of the SPIE Photonics West 2010*, Gallium Nitride Materials and Devices V, San Francisco, CA, Jan 2010.
14. G. Xu, Y. J. Ding, H. P. Zhao, M. Jamil, **G. Y. Liu**, N. Tansu, I. B. Zotova, C. E. Stutz, D. E. Diggs, N. Fernelius, F. K. Hopkins, C. S. Gallinat, G. Koblmüller, and J. S. Speck, "THz Generation from InN Films due to Destructive Interference between Optical Rectification and Photocurrent Surge," *Semiconductor Science and Technology*, vol. 25 (1), Art. 015004, January 2010.
15. **G. Y. Liu**, H. P. Zhao, J. Zhang, G. S. Huang, and N. Tansu, "Growths of Lattice-Matched AlInN Alloys on GaN," in *Proc. of the American Physical Society (APS) Annual March Meeting 2010*, Portland, Oregon, March 2010.
16. J. Zhang, H. Tong, **G. Y. Liu**, J. A. Herbsommer, G. S. Huang, and N. Tansu, "Thermoelectric Properties of MOVPE Grown AlInN Lattice-Matched to GaN," in *Proc. of the American Physical Society (APS) Annual March Meeting 2010*, Portland, Oregon, March 2010.
17. X. H. Li, Y. K. Ee, **G. Y. Liu**, P. Kumnorkaew, J. F. Gilchrist, and N. Tansu, "MOCVD Epitaxy of GaN by Employing SiO₂ Colloidal Microsphere Templates," in *Proc. of the American Physical Society (APS) Annual March Meeting 2010*, Portland, Oregon, March 2010.
18. **(Invited Conference Paper)** H. P. Zhao, **G. Y. Liu**, X. H. Li, Y. K. Ee, H. Tong, J. Zhang, G. S. Huang, and N. Tansu, "Novel Growth and Device Concepts for High-Efficiency InGaN Quantum Wells Light-Emitting Diodes," in *Proc. of the IEEE/OSA Conference on Lasers and Electro-Optics (CLEO) 2010*, San Jose, CA, May 2010.
19. **G. Y. Liu**, H. P. Zhao, J. H. Park, L. J. Mawst, and N. Tansu, "Growths of Ultra High Density InGaN-Based Quantum Dots on Self-Assembled Diblock Copolymer Nanopatterns," in *Proc. of the IEEE/OSA Conference on Lasers and Electro-Optics (CLEO) 2010*, San Jose, CA, May 2010.
20. G. Sun, S. K. Tripathy, Y. J. Ding, **G. Y. Liu**, G. S. Huang, H. P. Zhao, N. Tansu, and J. B. Khurgin, "Photoluminescence Emission in Deep Ultraviolet Region from GaN/AlN Asymmetric-Coupled Quantum Wells," in *Proc. of the IEEE/OSA Conference on Lasers and Electro-Optics (CLEO) 2010*, San Jose, CA, May 2010.
21. G. Sun, S. K. Tripathy, Y. J. Ding, **G. Y. Liu**, H. P. Zhao, G. S. Huang, N. Tansu, and J. B. Khurgin, "Photoluminescence Quenching Due to Relocation of Electrons in GaN/AlN Asymmetric-Coupled Quantum Wells," *Proc. IEEE/OSA Quantum Electronics and Laser Science Conference 2010*, San Jose, CA, May 2010.
22. **(Invited Review Article)** N. Tansu, H. P. Zhao, **G. Y. Liu**, X. H. Li, J. Zhang, H. Tong, and Y. K. Ee, "III-Nitride Photonics", *IEEE Photonics Journal*, vol. 2 (2), pp. 241-248, April 2010.
23. **(Invited Conference Paper)** H. P. Zhao, J. Zhang, **G. Y. Liu**, X. H. Li, Y. K. Ee, H. Tong, T. Toma, G. S. Huang, and N. Tansu, "Approaches for High-Efficiency InGaN Quantum Wells Light-Emitting Diodes-Device Physics and Epitaxy Engineering", *Proc. of American Vacuum Society (AVS) Meeting 2010*, Ann-Arbor, MI, May 2010.
24. **(Invited Conference Paper)** N. Tansu, H. P. Zhao, J. Zhang, **G. Y. Liu**, X. H. Li, H. Tong, T. Toma, G. S. Huang, and Y. K. Ee, "Device Physics and Epitaxy Engineering for High-Efficiency III-Nitride Light-Emitting Diodes," *Proc. of the International Union of Materials Research Societies - International Conference on Electronic Materials (IUMRS-ICEM) 2010*, Seoul, Korea, August 2010.

25. G. Sun, Y. J. Ding, **G. Y. Liu**, G. S. Huang, H. P. Zhao, N. Tansu, and J. B. Khurgin, "Photoluminescence Emission in Deep Ultraviolet Region from GaN/AlN Asymmetric-Coupled Quantum Wells", *Appl. Phys. Lett.*, vol. 97(2), Art. 021904, July 2010.
26. H. Tong, J. Zhang, **G. Y. Liu**, J. A. Herbsommer, G. S. Huang, and N. Tansu, "Thermoelectric Properties of Lattice-Matched AlInN Alloy Grown by Metalorganic Chemical Vapor Deposition", *Appl. Phys. Lett.*, vol. 97, Art. 112105, September 2010.
27. H. P. Zhao, **G. Y. Liu**, and N. Tansu, "Analysis of InGaN-delta-InN quantum wells for light-emitting diodes," *Appl. Phys. Lett.*, vol. 97, Art. 131114, September 2010.
28. H. P. Zhao, **G. Y. Liu**, R. A. Arif, and N. Tansu, "Current Injection Efficiency Quenching Leading to Efficiency Droop in InGaN Quantum Well Light-Emitting Diodes," *Solid State Electronics.*, vol. 54 (10), pp. 1119-1124, October 2010.
29. **G. Y. Liu**, H. P. Zhao, J. Zhang, H. Tong, G. S. Huang, and N. Tansu, "Growths and Characterization of Lattice-Matched AlInN Alloys", in Proc. of 23rd Annual Meeting of the IEEE Photonics Society, Denver, CO, Nov 2010.
30. H. P. Zhao, J. Zhang, T. Toma, **G. Y. Liu**, J. D. Poplawsky, V. Dierolf, and N. Tansu, "Cathodoluminescence Characteristics of Linearly-Shaped Staggered InGaN Quantum Wells Light-Emitting Diodes", in Proc. of the 23rd Annual Meeting of the IEEE Photonics Society, Denver, CO, November 2010.
31. J. Zhang, H. Tong, **G. Y. Liu**, J. A. Herbsommer, G. S. Huang, and N. Tansu, "Thermoelectric Properties of MOCVD-Grown AlInN Alloys with Various Compositions", in Proc. of the 23rd Annual Meeting of the IEEE Photonics Society, Denver, CO, November 2010.
32. **G. Y. Liu**, H. P. Zhao, J.-H. Park, L. J. Mawst, N. Tansu, "Selective Area Epitaxy of Ultra High Density InGaN Based Quantum Dots", in Proc. of the IEEE Photonics Society-Winter Topicals, January 2011.
33. **(Invited Conference Paper)** N. Tansu, H. P. Zhao, J. Zhang, **G. Y. Liu**, X. H. Li, Y. K. Ee, R. B. Song, T. Toma, L. Zhao, and G. S. Huang, "Novel Approaches for High-Efficiency InGaN Quantum Wells Light-Emitting Diodes – Device Physics and Epitaxy Engineering," in Proc. of the SPIE Photonics West 2011, LEDs: Materials, Devices, and Applications for Solid State Lighting XV, Paper 7954-42, San Francisco, CA, Jan 2011.
34. H. P. Zhao, J. Zhang, T. Toma, **G. Y. Liu**, J. D. Poplawsky, V. Dierolf, and N. Tansu, "MOCVD Growths of Linearly-Shaped Staggered InGaN Quantum Wells Light-Emitting Diodes at Green Spectral Regime," Proc. SPIE Photonics West 2011, GaN Materials and Devices VI, Paper 7939-4, San Francisco, CA, Jan 2011.
35. J. Zhang, H. Tong, **G. Y. Liu**, J. A. Herbsommer, G. S. Huang, and N. Tansu, "Thermoelectric Properties of MOCVD-Grown AlInN Alloys with Various Compositions," in Proc. of the SPIE Photonics West 2011, Gallium Nitride Materials and Devices VI, Paper 7939-37, San Francisco, CA, Jan 2011.
36. G. Sun, G. Xu, Y. J. Ding, H. P. Zhao, **G. Y. Liu**, J. Zhang, and N. Tansu, "Efficient Terahertz Generation from Multiple InGaN / GaN Quantum Wells", *IEEE J. Sel. Top. Quantum Electron.*, vol. 17, pp. 48-53, Jan-Feb 2011.
37. J. Zhang, H. Tong, **G. Y. Liu**, J. A. Herbsommer, G. S. Huang, and N. Tansu, "Characterizations of Seebeck Coefficients and Thermoelectric Figures of Merit for AlInN Alloys with Various In-Contents," *J. Appl. Phys.*, vol. 109 (5), Art. 053706, March 2011.
38. H. Zhao, J. Zhang, T. Toma, **G. Liu**, J. D. Poplawsky, V. Dierolf, and N. Tansu, "MOCVD Growths of Linearly Shaped Staggered InGaN Quantum Wells Light-Emitting Diodes," in Proc. of the American Physical Society (APS) Annual March Meeting 2011, Dallas, Texas, March 2011.
39. H. P. Zhao, J. Zhang, **G. Y. Liu**, and N. Tansu, "Surface Plasmon Dispersion Engineering via Double-Metallic Au / Ag Layers for Nitride Light-Emitting Diodes," in Proc. of the IEEE/OSA Conference on Lasers and Electro-Optics (CLEO) 2011, Paper CWF5, Baltimore, MD, May 2011.
40. **G. Y. Liu**, H. P. Zhao, J. Zhang, and N. Tansu, "Growths of InGaN-Based Light-Emitting Diodes with AlInN Thin Barrier for Efficiency Droop Suppression," in Proc. of the IEEE/OSA Conference on Lasers and Electro-Optics (CLEO) 2011, Paper CMDD6, Baltimore, MD, May 2011.
41. G. B. Xu, G. Sun, Y. J. Ding, H. P. Zhao, **G. Y. Liu**, J. Zhang, and N. Tansu, "Investigation of Blueshift of Photoluminescence Emission Peak in InGaN/GaN Multiple Quantum Wells," in Proc. of the IEEE/OSA Conference on Lasers and Electro-Optics (CLEO) 2011, Paper JWA70, Baltimore, MD, May 2011.
42. G. Sun, G. B. Xu, Y. J. Ding, H. P. Zhao, **G. Y. Liu**, J. Zhang, and N. Tansu, "High-Power Terahertz Generation due to Dipole Radiation within InGaN/GaN Multiple Quantum Wells," in Proc. of the IEEE/OSA Conference on Lasers and Electro-Optics (CLEO) 2011, Paper CMM4, Baltimore, MD, May 2011.

43. **G. Y. Liu**, H. P. Zhao, J. Zhang, J. H. Park, L. J. Mawst, and N. Tansu, "Selective Area Epitaxy of Ultra-High Density InGaN Quantum Dots by Diblock Copolymer," *Nanoscale Res. Lett.*, vol. 6, Art. 342, April 2011.
44. H. P. Zhao, J. Zhang, **G. Y. Liu**, and N. Tansu, "Surface Plasmon Dispersion Engineering via Double-Metallic Au / Ag Layers for III-Nitride Based Light-Emitting Diodes," *Appl. Phys. Lett.*, vol. 98, Art. 151115, April 2011.
45. **(Invited Journal Paper)** H. P. Zhao, **G. Y. Liu**, J. Zhang, J. D. Poplawsky, V. Dierolf, and N. Tansu, "Approaches for High Internal Quantum Efficiency Green InGaN Light-Emitting Diodes with Large Overlap Quantum Wells," *Optics Express*, vol. 19 (S4), pp. A991-A1007, July 2011.
46. J. Zhang, S. Kutlu, **G. Y. Liu**, and N. Tansu, "High-Temperature Characteristics of Seebeck Coefficients for AlInN Alloys Grown by Metalorganic Vapor Phase Epitaxy," *J. Appl. Phys.*, vol. 110, Art. 043710, August 2011.
47. G. Sun, G. B. Xu, Y. J. Ding, H. P. Zhao, **G. Y. Liu**, J. Zhang, and N. Tansu, "Investigation of Fast and Slow Decays in InGaN/GaN Quantum Wells," *Appl. Phys. Lett.*, vol. 99, Art. 081104, August 2011.
48. **G. Y. Liu**, J. Zhang, H. P. Zhao, and N. Tansu, "Device Characteristics of InGaN Quantum Well Light-Emitting Diodes with AlInN Thin Barrier Insertion," *Proc. of the SPIE Photonics West 2012, Gallium Nitride Materials and Devices VII*, San Francisco, CA, Jan 2012.
49. **G. Y. Liu**, J. D. Poplawsky, J. Zhang, V. Dierolf, H. P. Zhao, and N. Tansu, "Quantum Efficiency Characterizations of Staggered InGaN Quantum Wells Light-Emitting Diodes by Temperature-Dependent Electroluminescence Measurement," *Proc. of the SPIE Photonics West 2012, LEDs: Materials, Devices, and Applications for Solid State Lighting XVI*, San Francisco, CA, Jan 2012.
50. **G. Y. Liu**, J. Zhang, X. H. Li, G. S. Huang, T. Paskova, K. R. Evans, H. P. Zhao, and N. Tansu, "Metalorganic Vapor Phase Epitaxy and Characterizations of Nearly-Lattice-Matched AlInN Alloys on GaN / Sapphire Templates and Free-Standing GaN Substrates," *J. Cryst. Growth*, vol. 340 (1), pp. 66-73, February 2012.
51. **G. Y. Liu**, J. Zhang, C. K. Tan, and N. Tansu, "Characteristics of InGaN Quantum Wells Light-Emitting Diodes with Thin AlGaInN Barrier Layers," *Proc. of the IEEE Photonics Conference 2012*, Burlingame, CA, Sept 2012.
52. C. K. Tan, J. Zhang, X. H. Li, **G. Y. Liu**, and N. Tansu, "Dilute-As GaNAs Semiconductor for Visible Emitters," *Proc. of the IEEE Photonics Conference 2012*, Burlingame, CA, September 2012.
53. P. F. Zhu, J. Zhang, **G. Y. Liu**, and N. Tansu, "FDTD Modeling of InGaN-Based Light-Emitting Diodes with Microsphere Arrays," *Proc. of the IEEE Photonics Conference 2012*, Burlingame, CA, September 2012.
54. **G. Y. Liu**, J. Zhang, C. K. Tan, and N. Tansu, "InGaN-Delta-InN Quantum Well Light-Emitting Diodes with Carrier Transport Effect" *Proc. of the SPIE Photonics West 2013*, San Francisco, CA, Feb 2013.
55. C. K. Tan, J. Zhang, **G. Y. Liu**, and N. Tansu, "Effect of Interband Energy Separation on the Interband Auger Processes in III-Nitride Semiconductors," *Proc. of SPIE Photonics West 2013*, San Francisco, CA, Feb 2013.
56. P. F. Zhu, P. O. Weigel, **G. Y. Liu**, J. Zhang , A. L. Weldon , T. Muangnaphor, J. F. Gilchrist, and N. Tansu, "Optimization of Deposition Conditions for Silica / Polystyrene Microlens and Nanolens Arrays for Light Extraction Enhancement in GaN Light-Emitting Diodes," *Proc. of SPIE Photonics West 2013*, San Francisco, CA, Feb 2013.
57. G. Sun, R. Chen, Y. Ding, H. Zhao, **G. Liu**, J. Zhang, and N. Tansu, "Strikingly Different Behaviors of Photoluminescence and Terahertz Generation in InGaN/GaN Quantum Wells," *IEEE J. Sel. Top. Quantum Electron.*, vol. 19, no. 1, Art. 8400106, January / February 2013. DOI: 10.1109/JSTQE.2012.2218093
58. G. Xu, G. Sun, Y. J. Ding, H. P. Zhao, **G. Y. Liu**, J. Zhang, and N. Tansu, "Investigation of Large Stark Shifts in InGaN / GaN Multiple Quantum Wells", *J. Appl. Phys.*, vol 113, Art. 033104, January 2013. DOI: 10.1063/1.4775605
59. H. P. Zhao, **G. Y. Liu**, J. Zhang, R. A. Arif, and N. Tansu, "Analysis of Internal Quantum Efficiency and Current Injection Efficiency in Nitride Light-Emitting Diodes", *Journal of Display Technology*, vol. 9, no. 4, pp. 212-225, April 2013. DOI: 10.1109/JDT.2013.2250252
60. C. K. Tan, J. Zhang, X. H. Li, **G. Y. Liu**, B. O. Tayo, and N. Tansu, "First-Principle Electronic Properties of Dilute-As GaNAs Alloy for Visible Light Emitters", *Journal of Display Technology*, vol. 9, no. 4, pp. 272-279, April 2013. DOI: 10.1109/JDT.2013.2248342
61. **G. Y. Liu**, J. Zhang, C. K. Tan, and N. Tansu, "Efficiency-Droop Suppression by Using Large-Bandgap AlGaInN Thin Barrier Layers in InGaN Quantum Wells Light-Emitting Diodes", *IEEE Photonics Journal*, vol. 5, no. 2, Art. 2201011, April 2013. DOI: 10.1109/JPHOT.2013.2255028.

62. P. F. Zhu, **G. Y. Liu**, J. Zhang, and N. Tansu, "FDTD Analysis on Extraction Efficiency of GaN Light-Emitting Diodes with Microsphere Arrays", *Journal of Display Technology*, vol. 9, no. 5, pp. 317-323, May 2013. DOI: 10.1109/JDT.2013.2250253
63. X. H. Li, P. F. Zhu, **G. Y. Liu**, J. Zhang, R. B. Song, Y. K. Ee, P. Kumnorkaew, and J. F. Gilchrist, and N. Tansu, "Light Extraction Efficiency Enhancement of III-Nitride Light-Emitting Diodes by using 2-D Close-Packed TiO₂ Microsphere Arrays", *Journal of Display Technology*, vol. 9, no. 5, pp. 324-332, May 2013. DOI: 10.1109/JDT.2013.2246541
64. **(Invited Conference Paper)** N. Tansu, J. Zhang, **G. Y. Liu**, C. K. Tan, P. F. Zhu, and H. P. Zhao, "Internal and External Efficiency in InGaN-Based Light-Emitting Diodes," *Proc. of the ICMAT Conference 2013*, Material Research Society (MRS), Singapore, July 2013.
65. **(Invited Conference Paper)** C. K. Tan, J. Zhang, **G. Y. Liu**, and N. Tansu, "Exploration of New Materials for Visible Light-Emitting Diodes and Lasers – Dilute-As GaNAs Alloy," *Proc. of the SPIE Optics + Photonics 2012*, NanoEpitaxy : Materials and Devices V, San Diego, CA, August 2013.

Submitted Refereed Journal and Conference Publications

66. **G. Y. Liu** J. Zhang, C. K. Tan, and N. Tansu, "Characteristics of InGaN-Delta-InN Quantum Wells Light-Emitting Diodes for Green, Yellow and Red Emission", *IEEE Photonics Journal* (submitted).
67. Y. K. Ee, X. H. Li, J. Zhang, **G. Y. Liu**, H. P. Zhao, J. M. Biser, W. Cao, H. M. Chan, R.. P. Vinci, and N. Tansu, "Nano-pattern Pitch Dimension Dependence and Time-resolved Photoluminescence Study of InGaN Quantum Well Light-Emitting Diodes Grown by Abbreviated Growth Mode on Nano-patterned AGOG Substrate", *Journal of Display Technology* (submitted).
68. C. K. Tan, B. Tayo, J. Zhang, **G. Y. Liu** and N. Tansu, "First-Principle Natural Band Alignment of Dilute-As GaNAs Alloy", *Journal of Display Technology* (submitted).

Patents

1. Nelson Tansu, **Guangyu Liu**, and Hongping Zhao, "Ultrahigh Density InGaN-Based Quantum Dots for Optoelectronics Devices" (US Patent Pending).
2. Nelson Tansu, Hongping Zhao, and **Guangyu Liu**, "Novel Surface Plasmon Based Light-Emitting Diodes" (US Patent Pending).
3. Nelson Tansu, Hongping Zhao, **Guangyu Liu**, and Ronald A. Arif, "Methods to Suppress Efficiency-Droop for High-Power Nitride Light-Emitting Diodes Applicable for Solid State Lighting" (US Patent Pending).
4. Nelson Tansu, Hongping Zhao, **Guangyu Liu**, and Gensheng Huang, "Staggered InGaN Quantum Well with InN Delta-Layer" (US Patent Pending).
5. Nelson Tansu, Hua Tong, Jing Zhang, **Guangyu Liu**, and Gensheng Huang, "Novel techniques to achieve high thermoelectric figure of merit based on nitride semiconductor" (US Patent Pending).
6. Nelson Tansu, Xiao-Hang Li, Hongping Zhao, **Guangyu Liu**, Gensheng Huang, James F. Gilchrist, and Pisist Kumnorkaew, "Novel Supercontinuum Broadband White Light-Emitting Diodes" (US Patent Pending).

Invited Seminars

1. **Guangyu Liu**, "Internal Quantum Efficiency and Efficiency Droop in III-Nitride Light-Emitting Diodes," Intel Corporation, Hillsboro, OR, April 2013.

Selected Research Works Featured in Magazine / Newspapers

1. "You build yourself into what you do" in *Lehigh News Center Highlight*, August 15th, 2012.
<http://www4.lehigh.edu/news/newsarticle.aspx?Channel=%2fChannels%2fNews%3a+2012&WorkflowItemID=ab27191-029a-43fa-9abe-198d4e34aea2>
2. "A Revolution in Lighting" in Feature Section of *Resolve magazine*, vol. 2, Fall 2012.
http://www.nxtbook.com/nxtbooks/lehigh/resolve_2012vol2/#/20

3. “Nanoscale Work Yields Greener Lighting” in Research Section of *Lehigh Alumni Bulletin*, Winter 2012-2013.
http://www.nxtbook.com/nxtbooks/lehigh/alumni_2013winter/#/14

Professional and Synergistic Services

1. **Journal Reviewer:**
 - ✓ Optics Express
 - ✓ IEEE Photonics Journal
 - ✓ Optical Materials Express
 - ✓ Nanoscale Research Letters
 - ✓ IEEE/OSA Journal of Display Technology
 - ✓ Materials Research Bulletin
 - ✓ Journal of Photonics for Energy
2. **Vice President, SPIE Student Chapter at Lehigh University**, May 2010 – May 2011.
3. **President, SPIE Student Chapter at Lehigh University**, May 2011 – present.

Internal Scientific Lectures & Seminars (Non-Refereed)

1. N. Tansu, R. A. Arif, H. Zhao, Y. K. Ee, G. S. Huang, **G. Liu**, and X. Li, “High Efficiency III-Nitride Light-Emitting Diodes for Solid State Lighting,” Oral Presentation in Lehigh Center for Optical Technologies (COT) Open House 2008, COT Workshop on Solid State Materials for Energy Applications, *Lehigh University*, Bethlehem, Pennsylvania, USA, October 2008.
2. N. Tansu, M. Jamil, H. Zhao, **G. Liu**, and G. S. Huang, “Toward InGaN-Based Solar Cells,” Oral Presentation in Lehigh Center for Optical Technologies (COT) Open House 2008, COT Workshop on Solid State Materials for Energy Applications, *Lehigh University*, Bethlehem, Pennsylvania, USA, October 2008.
3. H. Zhao, **G. Liu**, X. H. Li, R. A. Arif, G. S. Huang, S. Tafon Penn, V. Dierolf, and N. Tansu, “Enhancement of Radiative Efficiency via Staggered InGaN Quantum Well Light Emitting Diodes,” Invited Poster Presentation in Transformation in Lighting 2009, *DOE R&D Workshop on Solid State Lighting 2009*, San Francisco, CA, USA, February 2009.
4. H. Zhao, **G. Liu**, X. H. Li, G. S. Huang, J. Poplawsky, V. Dierolf, and N. Tansu, “Staggered InGaN Quantum-Well Light-Emitting Diodes,” Oral Presentation in Lehigh Center for Optical Technologies (COT) Open House 2009, COT Workshop on NanoPhotonics, *Lehigh University*, Bethlehem, Pennsylvania, USA, October 2009.
5. **G. Liu**, H. Zhao, G. S. Huang, and N. Tansu, “Electron-Photon and Electron-Phonon Intersubband Scatterings in AlN / GaN and AlInN / GaN Quantum Wells,” Poster Presentation in Lehigh Center for Optical Technologies (COT) Open House 2009, COT Workshop on NanoPhotonics, *Lehigh University*, Bethlehem, Pennsylvania, USA, October 2009.
6. H. Zhao, **G. Liu**, X. H. Li, G. S. Huang, J. Poplawsky, S. Tafon Penn, V. Dierolf, and N. Tansu, “Growths of Staggered InGaN Quantum Wells Light-Emitting Diodes Emitting at 520-525 nm Employing Graded Growth-Temperature Profile,” Poster Presentation in Lehigh Center for Optical Technologies (COT) Open House 2009, COT Workshop on NanoPhotonics, *Lehigh University*, Bethlehem, Pennsylvania, USA, October 2009.
7. H. Zhao, **G. Liu**, R. A. Arif, and N. Tansu, “Current Injection Efficiency and Efficiency-Droop of InGaN Quantum Well Light-Emitting Diodes,” Poster Presentation in Lehigh Center for Optical Technologies (COT) Open House 2009, COT Workshop on NanoPhotonics, *Lehigh University*, Bethlehem, Pennsylvania, USA, October 2009.
8. H. Zhao, **G. Liu**, J. Zhang, T. Toma, G. S. Huang, J. D. Poplawsky, V. Dierolf, and N. Tansu, “Enhancement of Internal Quantum Efficiency with Staggered InGaN Quantum Wells Light-Emitting Diodes,” Poster Presentation in Nano-Energy Workshop 2010, *Lehigh University*, Bethlehem, Pennsylvania, USA, September 2010.
9. H. Zhao, **G. Liu**, J. Zhang, T. Toma, G. S. Huang, J. D. Poplawsky, V. Dierolf, and N. Tansu, “Enhancement of Internal Quantum Efficiency with Staggered InGaN Quantum Wells Light-Emitting Diodes,” Poster Presentation in Lehigh Center for Optical Technologies (COT) Open House 2010, COT Workshop on NanoPhotonics, *Lehigh University*, Bethlehem, Pennsylvania, USA, October 2010.

Outreach Lectures and Seminars (for Middle School and High School Students)

1. Nelson Tansu, Ronald A. Arif, Hongping Zhao, Hua Tong, Yik Khoon Ee, Xiaohang Li, and **Guangyu Liu**, "Semiconductor Nanotechnology for High Energy Efficient Applications," Outreach Program, OptoCamp 2008 – Center for Optical Technologies, ***Lehigh University***, Bethlehem, Pennsylvania, USA, August 2008.
2. Nelson Tansu, Hongping Zhao, Hua Tong, Yik Khoon Ee, Xiaohang Li, and **Guangyu Liu**, "Semiconductor Nanotechnology for High Energy Efficient Applications," Outreach Program, OptoCamp 2009 – Center for Optical Technologies, ***Lehigh University***, Bethlehem, Pennsylvania, USA, August 2009.

References

1. **Prof. Nelson Tansu (PhD Advisor)**
Class of 1961 Associate Professor
Department of Electrical and Computer Engineering
Center for Photonics and Nanoelectronics
Lehigh University
Bethlehem, PA 18015, USA
Email: Tansu@Lehigh.Edu, Phone: (610) 758-2678, Fax: (610) 758-2605
Research Group: <http://www.ece.lehigh.edu/~tansu>
2. **Prof. Filbert J. Bartoli**
Chandler Weaver Chair Professor, and ECE Department Chair
Department of Electrical and Computer Engineering
Lehigh University
Bethlehem, PA 18015, USA
Email: fjb205@Lehigh.Edu, Phone: (610) 758-4069
<http://www.ece.lehigh.edu/index.php?page=filbert-j-bartoli>
3. **Prof. Luke J. Mawst**
Professor
Department of Electrical and Computer Engineering
Reed Center for Photonics
University of Wisconsin-Madison
1415 Engineering Dr., Madison, WI 53706, USA
Email: mawst@engr.wisc.edu, Phone: (608) 263-1705
http://www.engr.wisc.edu/ece/faculty/mawst_luke.html
4. **Prof. Michael J. Stavola**
Sherman Fairchild Chair Professor of Physics
Associate Dean for Research and Graduate Studies, College of Arts and Sciences
Department of Physics
Lehigh University
Bethlehem, PA 18015, USA
Email: mjsa@Lehigh.Edu, Phone: (610) 758-4282
<http://www.lehigh.edu/~mjsa/mjsa.html>
5. **Prof. Hongping Zhao**
Assistant Professor
Department of Electrical Engineering and Computer Science
Case Western Reserve University
Cleveland, OH 44106, USA
Email: hongping.zhao@case.edu, Phone: (216) 368-4120
<http://engineering.case.edu/profiles/hxz168>