

TEXAS STATE VITA

I. Academic/Professional Background

A. Edwin L. Piner, Chair & Professor
601 University Drive
3240 RFM Building
San Marcos, TX 78666

B. Educational Background

Ph.D., 1998, North Carolina State University, Material Science and Engineering, “*Growth and Characterization of Metalorganic Chemical Vapor Deposition InGaN*”

B.S., 1993, North Carolina State University, Material Science and Engineering

C. University Experience

<i>Position</i>	<i>University</i>	<i>Dates</i>
Director, NSF CREST UWBG Research Center, Texas State		2025-present
Co-director, Materials Application Research Center, Texas State		2024-present
Physics Department Chair	Texas State University	2023-present
Visiting Research Professor (Sabbatical)	Padova University, Italy, EU	2022/07-2023/07
Professor	Texas State University	2013-present
Associate Professor	Texas State University	2010-2013

D. Relevant Professional Experience

<i>Position</i>	<i>Entity</i>	<i>Dates</i>
Fellow	National Academy of Inventors	2024-present
Founder, CEO	Applied Epitaxial Materials, Inc.	2013-present
Director, Advanced Technology	Nitronex Corporation	2000-2009
Research Engineer	ATMI Corporation/Epitronics	1998-2000

II. TEACHING

B. Courses Taught:

MSEC 7401 – Fundamentals of Materials Science and Engineering – Fall 2012 / 2013 / 2014 / 2015 / 2016 / 2017 / 2018 / 2019 / 2020 / 2021

MSEC 7402 – Advanced Materials Science and Engineering Concepts – Spring 2013 / 2014 / 2015 / 2016 / 2017 / 2018 / 2019 / 2020 / 2021 / 2022

MSEC 7312 – Thermodynamics and Kinetics for Material Scientists (as special topic, enabling student to complete, originally taken with Dr. Spencer) – Fall 2017

MSEC 7303 – Research in MSEC (Defects in Group III Nitride Semiconductors and Their Effect on AlGaIn/GaN HEMT) – Spring 2016

MSEC 7303 – Research in MSEC (Transmission Electron Microscopy, Theory & Practice) – Fall 2015

MSEC 7303 – Research in MSEC (Microwave & Power Device Physics & Materials) – Spring 2014

PHYS 5404 – Experimental Methods (course coordinator – supported by Drs. Geerts, Holtz, Theodoropolou, Wistey, Zakhidov) – Fall 2017

PHYS 5326 – Electrical Characterization of Materials – Spring 2012

PHYS 5327 – Semiconductor Device Physics – Fall 2018

PHYS 5322 – Semiconductor Device Microfabrication – Fall 2011

PHYS 5100 – Professional Development – Spring 2018

PHYS 2150 – Professional Development for Beginning Physicists – Fall 2023 / 2024 / Spring 2024 / 2025

PHYS 1430 – Mechanics – Spring 2010 / Fall 2010 / Spring 2011

C. Graduate Theses/Dissertations, Honors Theses, or Exit Committees:

Nelson Simpson	MS Physics	May 2013	
Jon Anderson	MS Physics	June 2014	Chair/supervisor
Hanu Arava	MS Physics	July 2014	
Kunal Bhatnagar	PhD MSEC	June 2015	
Jeffrey Simpson	PhD MSEC	October 2016	Chair/supervisor
Logan Hancock	PhD MSEC	November 2016	
Lanre Ogedengbe	PhD MSEC	June 2017	
Raju Ahmed	PhD MSEC	March 2018	Chair/supervisor
Peter Walker	MS Physics	March 2018	
Kevin Lyon	MS Physics	April 2019	
Anupam KC	MS Physics	June 2019	Chair/supervisor
Anwar Siddique	PhD MSEC	June 2019	Chair/supervisor
Mehedhi Hasan	PhD MSEC	June 2019	
Andy de la Garza	MS Physics	September 2019	Co-Chair/supervisor
Carol Ellis-Terrell	PhD MSEC	April 2020	
Chhabindra Gautam	MS Physics	April 2020	Chair/supervisor
Jon Anderson	PhD MSEC	June 2020	Chair/supervisor
Joyce Anderson	PhD MSEC	June 2020	
Nischal Khakurel	MS Physics	July 2020	
Rony Saha	PhD MSEC	July 2021	Co-Chair/supervisor
Shamim Reza	PhD MSEC	December 2021	
Anupam KC	PhD MSEC	March 2022	Co-Chair/supervisor
Ganesh Aryal	MS Physics	October 2022	Chair/supervisor
Augustus Arbogast	MS Physics	November 2022	
Tuhin Dey	PhD MSEC	June 2023	
Daniel Bailey	MS Physics	November 2023	Chair/supervisor
Anival Ayala	PhD MSEC	April 2024	
Istiaq Firoz Shiam	MS Elec Engr	July 2024	
Biddhut Lamichhane	MS Physics	August 2024	Chair/supervisor
Maria Sultana	MS Elec Engr	August 2024	
Binod D.C.	PhD MSEC	November 2024	
Dipa Devkota	PhD MSEC	June 2025	
Sadia Rab	MS Physics	July 2025	
John Miracle	PhD MSEC	December 2025 (projected)	
Farah Najdawi	PhD MSEC	December 2025 (projected)	
Erik Drummond	MS Physics	May 2026 (projected)	Chair/supervisor
Ganesh Aryal	PhD MSEC	May 2026 (projected)	Chair/supervisor
Md Reaz Rahman Munna	PhD MSEC	May 2026 (projected)	
Khorshed Alam	PhD MSEC	December 2026 (projected)	
Daniel Bailey	PhD MSEC	December 2026 (projected)	Chair/supervisor
Md Shihab Uddin	PhD MSEC	August 2027 (projected)	Chair/supervisor
Khorshed Alam	PhD MSEC	December 2027 (projected)	

D. Courses Prepared and Curriculum Development:

MSEC 7402 – Advanced Materials Science and Engineering Concepts – Spring, 2013 (100% new material); a follow-up unique course (partnered with MSEC 7401) designed to give all incoming PhD students a common foundation in materials science and engineering, with advanced topics relative to MSEC 7401.

MSEC 7401 – Fundamentals of Materials Science and Engineering – Fall, 2012 (100% new material) / Fall, 2013; a unique course, compared to other MSE PhD curriculum, designed to give all incoming PhD students a common foundation in materials science and engineering.

MSEC 7303 – Research in MSEC (Microwave & Power Device Physics & Materials) – Spring 2014 (100% new material); a unique self-study course, based on the requests of MSEC graduate students, to develop and understand microwave and power device physics and the materials properties that determine best device operating performance.

Chair – MSEC Curriculum Committee: Giving guidance to departments that desire to establish an effective route for their undergraduates to successfully transition into the MSEC PhD program.

PHYS 5322 – Semiconductor Device Microfabrication – Fall 2011 (75+% new material); completely new lecture materials with emphasis on “real world” application-based device fabrication processes.

PHYS 5327 – Semiconductor Device Physics – Fall 2018 (100% new material); completely new lecture materials focused on advanced texts of semiconductor devices and supplementary materials to round-out a complete study of the topic.

PHYS 5404 – Experimental Methods – Fall 2017 (100% new material); redefined the scope of the course to encompass intensive lab-based exercises, coordinated with five other professors, throughout the semester. Semester reports and final presentation round-out the course evaluation.

III. SCHOLARLY/CREATIVE

A. Works in Print (including works accepted, forthcoming, in press)

1. Books

Chapters in Books:

Edwin L. Piner and Mark W. Holtz, “Three-Dimensional Integration of Diamond and GaN”. In Marko Tadjer and Travis Anderson (eds.), **Thermal Management of Gallium Nitride Electronics**, Elsevier, July 2022. DOI: 10.1016/B978-0-12-821084-0.00019-6

Don Olson and Edwin L. Piner, “Dating Monet’s *Le Port du Havre, Effet de Nuit*”. In Géraldine Lefebvre, **Monet au Havre, Les Années Décisives**, Editions Hazan, October 19, 2016. ISBN: 2754108610.

Wayne Johnson and Edwin L. Piner, “GaN HEMT Technology”. In S. Pearton (ed.), **GaN and ZnO-based Materials and Devices**, Springer Series in Materials Science, **Vol. 156** (2012). Berlin: Springer-Verlag. DOI: 10.1007/978-3-642-23521-4_7.

2. Articles

a. Refereed Journal Articles:

1. “Lateral Growth of Diamond Based on Precise Seeding Patterns Using Electron-Beam Lithography,” Florence A. Nugera, Jonathan Anderson, Dipa Devkota, Ganesh Aryal, Joyce H. Anderson, Chris Engdahl, Edwin L. Piner, and Mark W. Holtz, *Functional Diamond*, Vol. 5, no. 1, 2533893 (2025). DOI: 10.1080/26941112.2025.2533893
2. “Effect of CH₄ Concentration on the Early Growth Stage of Patterned Diamond Using High Seeding Density and Hot Filament Chemical Vapor Deposition,” Florence A. Nugera, Dipa Devkota, Anupam K.C., Anival Ayala, Ganesh Aryal, Chris Engdahl, Edwin L. Piner, and

- Mark W. Holtz, J. Materials Science, **59**, 6835-6848 (2024). DOI: 10.1007/s10853-024-09641-1
3. "Diamond Deposition on AlN Using Q-Carbon Interlayer Through Overcoming the Substrate Limitations," Saif Taqy, Pallab Sarkar, Md Abdul Hamid, Tarik Pranto, Edwin L. Piner, Ravi Droopad, and Ariful Haque, Carbon, **219**, 118809 (2024). DOI: 10.1016/j.carbon.2024.118809
 4. "Influence of H on Sn Incorporation in GeSnC Alloys Grown Using Molecular Beam Epitaxy," Tuhin Dey, Augustus W. Arbogast, Qian Meng, Md. Shamim Reza, Aaron J. Muhowski, Joshua J. P. Cooper, Erdem Ozdemir, Fabian U. Naab, Thales Borrelly, Jonathan Anderson, Rachel S. Goldman, Daniel Wasserman, Seth R. Bank, Mark W. Holtz, Edwin L. Piner, and Mark A. Wistey, J. Appl. Phys., **134**(19), 193102 (2023). DOI: 10.1063/5.0173429
 5. "Atomic layer deposition of Al₂O₃ interlayer for improving AlN growth on silicon substrates," Rony Saha, Jonathan Anderson, Mark W. Holtz and Edwin L. Piner, J. Vac. Sci. Technol. A **41**(5), 053208 (2023). DOI: 10.1116/6.0002760
 6. "Heterogeneous Integration of High-Quality Diamond on Aluminum Nitride with Low and High Seeding Density," Anupam K.C., Jonathan Anderson, Anival Ayala, Christopher Engdahl, Edwin L. Piner, and Mark W. Holtz, J. Crystal Growth **610**, (2023). DOI: 10.1016/j.jcrysgro.2023.127172
 7. "Preferentially Oriented Growth of Diamond Films on Silicon with Nickel Interlayer," Anupam K.C., Anwar Siddique, Jonathan Anderson, Rony Saha, Chhabindra Gautam, Anival Ayala, Chris Engdahl, Mark W. Holtz, and Edwin L. Piner, SN Appl. Sci., **4**(226), (2022). DOI: 10.1007/s42452-022-05092-y
 8. "Effect of Seeding Density on the Growth of Diamond Films by Hot-Filament Chemical Vapor Deposition from Sparse to Dense Range," Anupam K.C., Rony Saha, Jonathan Anderson, Anival Ayala, Chris Engdahl, Edwin L. Piner, and Mark Holtz, J. Appl. Phys., **130**(22), 225302 (2021). DOI: 10.1063/5.0068541
 9. "Improved Electrical Properties of AlGa_N/Ga_N High Electron Mobility Transistors by in-situ Tailoring the Si_N_x Passivation Layer," Anwar Siddique, Raju Ahmed, Jonathan Anderson, Mark Holtz and Edwin Piner, ACS Appl. Mater. Interfaces, **13**(15), 18264–18273 (2021). DOI: 10.1021/acsami.1c01241
 10. "Integration of Ga_N and Diamond Using Epitaxial Lateral Overgrowth," Raju Ahmed, Anwar Siddique, Jonathan Anderson, Chhabindra Gautam, Mark Holtz and Edwin Piner, ACS Appl. Mater. Interfaces, **12**(35), 39397–39404 (2020). DOI: 10.1021/acsami.0c10065
 11. "Effect of Precursor Stoichiometry on Morphology, Phase Purity and Texture Formation of Hot Filament CVD Diamond Films Grown on Si (100) Substrate," Raju Ahmed, Anwar Siddique, Rony Saha, Jonathan Anderson, Chris Engdahl, Mark Holtz and Edwin Piner, J. Mater. Sci.: Mater. Electron., **31**(11), 8597-8606 (2020). DOI: 10.1007/s10854-020-03395-7.
 12. "Structure and Interface Analysis of Diamond on an AlGa_N/Ga_N HEMT Utilizing an *In-situ* Si_N_x Interlayer Grown by MOCVD," Anwar Siddique, Raju Ahmed, Jonathan Anderson, Mohammad Nazari, Luke Yates, Samuel Graham, Mark Holtz, and Edwin L. Piner, ACS Appl. Electron. Mater., **1**(8), 1387-1399 (2019). DOI: 10.1021/acsaelm.9b00131

13. "Effect of Reactant Gas Stoichiometry of *in-situ* SiN_x Passivation on Structural Properties of MOCVD AlGaIn/GaN HEMTs," Anwar Siddique, Raju Ahmed, Jonathan Anderson, and Edwin L. Piner, *J. Crystal Growth* **517**, 28-34 (2019). DOI: 10.1016/j.jcrysgro.2019.03.020
14. "Selective Area Deposition of Hot Filament CVD Diamond on 100 mm MOCVD Grown AlGaIn/GaN Wafers," Raju Ahmed, Anwar Siddique, Jonathan Anderson, Chris Engdahl, Mark Holtz, and Edwin L. Piner, *Cryst. Growth Des.* **19**(2) 672-677 (2019). DOI: 10.1021/acs.cgd.8b01260
15. "Low Thermal Boundary Resistance Interfaces for GaN-on-Diamond Devices," Luke Yates, Jonathan Anderson, Xing Gu, Cathy Lee, Tingyu Bai, Matthew Mecklenburg, Toshihiro Aoki, Mark S. Goorsky, Martin Kuball, Edwin L. Piner, and Samuel Graham, *ACS Appl. Mater. Interfaces*, **10**(28) 24302 (2018). DOI: 10.1021/acsami.8b07014
16. "Ultraviolet micro-Raman Stress Map of Polycrystalline Diamond Grown Selectively on Silicon Substrates Using Chemical Vapor Deposition," R. Ahmed, M. Nazari, B. L. Hancock, J. Simpson, C. Engdahl, E. L. Piner, and M. W. Holtz, *Appl. Phys. Lett.* **112**(18) 181907 (2018). DOI: 10.1063/1.5027507
17. "Optical Characterization and Thermal Properties of CVD Diamond Films for Integration with Power Electronics," M. Nazari, B.L. Hancock, J. Anderson, K.D. Hobart, T.I. Feygelson, M.J. Tadjer, B.B. Pate, T.J. Anderson, E.L. Piner, M.W. Holtz, *Solid-State Electronics* **136** 12-17 (2017). DOI: 10.1016/j.sse.2017.06.025.
18. "Hexagonal Boron Nitride Particles for Determining the Thermal Conductivity of Diamond Films Based on Near-Ultraviolet micro-Raman Mapping," B. Squires, B.L. Hancock, M. Nazari, J. Anderson, K.D. Hobart, T.I. Feygelson, M.J. Tadjer, B.B. Pate, T.J. Anderson, E.L. Piner, and M.W. Holtz, *Journal of Physics D: Applied Physics*, **50**(24) 24LT01 (2017). DOI: 10.1088/1361-6463/aa6f44
19. "RF Dielectric Loss Due to MOCVD Aluminum Nitride on High Resistivity Silicon," Feyza Berber, Derek W. Johnson, Kyle M. Sundqvist, Edwin L. Piner, Gregory H. Huff, and H. Rusty Harris, *Transactions on Microwave Theory and Techniques*, **65**(5) (2017). DOI: 10.1109/TMTT.2017.2656865
20. "Ultraviolet and Visible micro-Raman and micro-Photoluminescence Spectroscopy Investigations of Stress on a 75-mm GaN-on-diamond Wafer," B.L. Hancock, M. Nazari, J. Anderson, E.L. Piner, F. Faili, S. Oh, D. Francis, D. Twitchen, S. Graham, and M.W. Holtz, *Phys. Status Solidi C*, 1600247 (2017) (IWN 2016 - Nitride Semiconductors Proceedings). DOI: 10.1002/pssc.201600247
21. "Ultraviolet Micro-Raman Spectroscopy Stress Mapping of a 75-mm GaN-on-Diamond Wafer," B.L. Hancock, M. Nazari, J.W. Anderson, E.L. Piner, F. Faili, S. Oh, D. Twitchen, S. Graham, and M. Holtz, *Appl. Phys. Lett.* **108**(21) 211901 (2016). DOI: 10.1063/1.4952596
22. "Near-Ultraviolet Micro-Raman Study of Diamond Grown on GaN," M. Nazari, B.L. Hancock, J.W. Anderson, A. Savage, E.L. Piner, S. Graham, F. Faili, S. Oh, D. Francis, D. Twitchen, and M. Holtz, *Appl. Phys. Lett.*, **108**(3) 031901 (2016). DOI: 10.1063/1.4940200
23. "Self-heating Profile in an AlGaIn/GaN Heterojunction Field-Effect Transistor Studied by Ultraviolet and Visible Micro-Raman Spectroscopy," M. Nazari, B.L. Hancock, E.L. Piner, and M.W. Holtz, *IEEE Trans. Electron Devices*, **62**(5), 1467-1472 (2015). DOI: 10.1109/TED.2015.2422913

24. "Challenges of Contact Module Integration for GaN-based Devices in a Si-CMOS Environment," Derek W. Johnson, Pradhyumna Ravikirithi, Jae Woo Suh, Rinus T. P. Lee, Richard J. W. Hill, Man Hoi Wong, Edwin L. Piner and H. Rusty Harris, *J. Vac. Sci. Technol. B* **32**, 030606 (2014). DOI: 10.1116/1.4874801
25. "Threshold Voltage Shift Due to Charge Trapping in Dielectric-Gated AlGaIn/GaN High Electron Mobility Transistors Examined in Au-Free Technology," D.W. Johnson, R.T.P. Lee, R.J.W. Hill, M.H. Wong, G. Bersuker, E.L. Piner, P.D. Kirsch, and H.R. Harris, *IEEE Trans. Electron Devices*, **60**(10), 3197-3203 (2013). DOI: 10.1109/TED.2013.2282460
26. "PECVD Silicon Nitride Passivation of AlGaIn/GaN Heterostructures," I.R. Gatabi, D.W. Johnson, J.H. Woo, J.W. Anderson, M.R. Coan, E.L. Piner, and H.R. Harris, *IEEE Trans. Electron Devices*, **60**(3), 1082-1087 (2013). DOI: 10.1109/TED.2013.2242075
27. "InGaIn/GaN Multiple-Quantum-Well Light-Emitting Diodes Grown on Si(111) Substrates with ZrB₂(0001) Buffer Layers," A.H. Blake, D. Caselli, C. Durot, J. Mueller, E. Parra, J. Gilgen, A. Boley, D.J. Smith, I.S.T. Tsong, J.C. Roberts, E. Piner, K. Linthicum, J.W. Cook, Jr., D.D. Koleske, M.H. Crawford, and A.J. Fischer, *J. Appl. Phys.*, **111**(3), 033107 (2012). DOI: 10.1063/1.368557
28. "Nanometric AlGaIn/GaN HEMT Performance with Implant or Mesa Isolation," H. Sun, A.R. Alt, S. Tirelli, D. Marti, H. Benedickter, E. Piner, and C.R. Bolognesi, *IEEE Electron Device Lett.*, **32**(8), 1056-1058 (2011). DOI: 10.1109/LED.2011.2151172
29. "Detection of Vitellogenin, an Endocrine Disrupter Biomarker, Using AlGaIn/GaN High Electron Mobility Transistors," B.H. Chu, C.Y. Chang, K. Kroll, N. Denslow, Y-L Wang, S.J. Pearton, J. Lin, A.M. Dabiran, A.M. Wowchak, B. Cui, P.P. Chow, J.W. Johnson, P. Rajagopal, J.C. Roberts, E.L. Piner, K.J. Linthicum, and F. Ren, *Phys. Stat. Sol. (C)* **8**, No. 7-8, 2486-2488 (2011). DOI: 10.1002/pssc.201001171
30. "Thin-body N-face GaN Transistor Fabricated by Direct Wafer Bonding," K.K. Ryu, J.C. Roberts, E.L. Piner, and T. Palacios, *IEEE Electron Device Lett.*, **32**(7), 895-897 (2011). DOI: 10.1109/LED.2011.2147751
31. "Schottky-Ohmic Drain AlGaIn/GaN Normally Off HEMT With Reverse Drain Blocking Capability," C. Zhou, W. Chen, E.L. Piner, and K.J. Chen, *IEEE Electron Device Lett.*, **31**(7), 668-670 (2010). DOI: 10.1109/LED.2010.204885
32. "Schottky-Drain Technology for AlGaIn/GaN High-Electron Mobility Transistors," B. Lu, E.L. Piner, and T. Palacios, *IEEE Electron Device Lett.*, **31**(4), 302-304 (2010). DOI: 10.1109/LED.2010.2040704
33. "Chloride Ion Detection by InN Gated AlGaIn/GaN High Electron Mobility Transistors," Byung-Hwan Chu, Hon-Way Lin, Shangjr Gwo, Yu-Lin Wang, S. J. Pearton, J.W. Johnson, P. Rajagopal, J.C. Roberts, E.L. Piner, K.J. Linthicum, and Fan Ren, *J. Vacuum Science & Technology B* **28**, L5 (2010). DOI: 10.1116/1.3271253
34. "Oxygen Gas Sensing at Low Temperature Using Indium Zinc Oxide-gated AlGaIn/GaN High Electron Mobility Transistors," Yu-Lin Wang, C. Y. Chang, Wantae Lim, S. J. Pearton, D.P. Norton, B.H. Chu, C.F. Lo, F. Ren, J.W. Johnson, P. Rajagopal, J.C. Roberts, E.L. Piner, and K.J. Linthicum, *J. Vacuum Science & Technology B* **28**, 376 (2010); DOI: 10.1116/1.3368467
35. "107-GHz (Al,Ga)N/GaN HEMTs on Silicon with Improved Maximum Oscillation Frequencies," S. Tirelli, D. Marti, H. Sun, A.R. Alt, H. Benedickter, E.L. Piner, and C.R.

- Bolognesi, IEEE Electron Device Lett., **31**(4), 296-298 (2010). DOI: 10.1109/LED.2010.2039847
36. "Wireless Detection System for Glucose and pH Sensing in Exhaled Breath Condensate Using AlGa_N/Ga_N High Electron Mobility Transistors," B.H. Chu, B.S. Kang, C.Y. Chang, F. Ren, A. Goh, A. Sciullo, W. Wu, J. Lin, B.P. Gila, S.J. Pearton, J.W. Johnson, E.L. Piner, and K. J. Linthicum, IEEE Sensors Journal, **10**(1), 64-70 (2010). DOI: 10.1109/JSEN.2009.2035213
 37. "AlGa_N/Ga_N Dual-Channel Lateral Field-Effect Rectifier with Punch-Through Breakdown Immunity and Low On-Resistance," C. Zhou, W.J. Chen, E.L. Piner, and K.J. Chen, IEEE Electron Device Lett., **31**(1), 5-7 (2010). DOI: 10.1109/LED.2009.2034761
 38. "Gate-First AlGa_N/Ga_N HEMT Technology for High-Frequency Applications," O.I. Saadat, J.W. Chung, E.L. Piner, and T. Palacios, IEEE Electron Device Lett., **30**(12), 1254-1256 (2009). DOI: 10.1109/LED.2009.2032938
 39. "Seamless On-Wafer Integration of Si(100) MOSFETs and Ga_N HEMTs," J.W. Chung, J. Lee, E.L. Piner, and T. Palacios, IEEE Electron Device Lett., **30**(10), 1015-1017 (2009). DOI: 10.1109/LED.2009.2027914
 40. "Detection of Cl⁻ Ions with AlGa_N/Ga_N High Electron Mobility Transistors," S.C. Hung, B.H. Chu, C.F. Lo, B. Hicks, Y.L. Wang, C.Y. Chang, S.J. Pearton, J.W. Johnson, P. Rajagopal, J.C. Roberts, E.L. Piner, K.J. Linthicum, G.C. Chi, and F. Ren, ECS Transactions, **19**(3) 31-37 (2009). DOI: 10.1149/1.3120683
 41. "Observation of Terahertz Radiation Coherently Generated by Acoustic Waves," M.R. Armstrong, E.J. Reed, K.-Y. Kim, J.H. Glowina, W.M. Howard, E.L. Piner, and J.C. Roberts, Nature Physics, DOI: 10.1038/NPHYS1219, 15 March 2009.
 42. "N-Face Ga_N/AlGa_N HEMTs Fabricated Through Layer Transfer Technology," J.W. Chung, E.L. Piner, and T. Palacios, IEEE Electron Device Lett., **30**(2), 113-116 (2009). DOI: 10.1109/LED.2008.2010415
 43. "Cu-Plated Through-Wafer Vias for AlGa_N/Ga_N High Electron Mobility Transistors on Si," K.-H. Chen, F. Ren, A. Pais, H. Xie, B.P. Gila, S.J. Pearton, J.W. Johnson, P. Rajagopal, J.C. Roberts, E.L. Piner, and K.J. Linthicum, J. Vacuum Science & Technology. B, Microelectronics And Nanometer Structures: Processing, Measurement, And Phenomena, **27**(5), 2166 (2009). DOI: 10.1116/1.3212931
 44. "Ga_N-on-Si HEMTs: From Device Technology to Product Insertion," W. Johnson, S. Singhal, A. Hanson, R. Therrien, A. Chaudhari, W. Nagy, P. Rajagopal, Q. Martin, T. Nichols, A. Edwards, J. Roberts, E. Piner, I. Kizilyalli, and K. Linthicum, Mater. Res. Soc. Symp. Proc., **1068**, 3-12 (2008). DOI: 10.1557/PROC-1068-C04-01
 45. "AlGa_N Transition Layers on Si(111) Substrates – Observations of Microstructure and Impact on Material Quality," J.C. Roberts, J.W. Cook, Jr., P. Rajagopal, E.L. Piner, and K.J. Linthicum, Mater. Res. Soc. Symp. Proc., **1068**, 147-152 (2008). DOI: 10.1557/PROC-1068-C06-03
 46. "Exhaled-Breath Detection Using AlGa_N/Ga_N High Electron Mobility Transistors Integrated with a Peltier Element," B.S. Kang, H.T. Wang, F. Ren, B.P. Gila, C.R. Abernathy, S.J. Pearton, D.M. Dennis, J.W. Johnson, P. Rajagopal, J.C. Roberts, E.L. Piner, and K.J. Linthicum, Electrochem. Solid-State Lett., **11**(3) pp. J19-J21 (2008). DOI: 10.1149/1.2824500

47. "Effect of Gate Leakage in the Subthreshold Characteristics of AlGaIn/GaN HEMTs," J.W. Chung, J.C. Roberts, E.L. Piner, and T. Palacios, *IEEE Electron Device Lett.*, **29**(11), 1196-1198 (2008). DOI: 10.1109/LED.2008.2005257
48. "CO₂ Detection Using Polyethylenimine/Starch Functionalized AlGaIn/GaN High Electron Mobility Transistors," C.Y. Chang, B.S. Kang, H.T. Wang, F. Ren, Y.L. Wang, S.J. Pearton, D.M. Dennis, J.W. Johnson, P. Rajagopal, J.C. Roberts, E.L. Piner, and K.J. Linthicum, *Appl. Phys. Lett.* **92**(23), 232102 (2008). DOI: 10.1063/1.2937126
49. "c-erbB-2 Sensing Using AlGaIn/GaN HEMTs for Breast Cancer Detection," K.H. Chen, B.S. Kang, H.T. Wang, T.P. Lele, F. Ren, Y.L. Wang, C.Y. Chang, S.J. Pearton, D.M. Dennis, J.W. Johnson, P. Rajagopal, J.C. Roberts, E.L. Piner, and K.J. Linthicum, *Appl. Phys. Lett.* **92**(19), 192103 (2008). DOI: 10.1063/1.2926656
50. "Integration of Selective Area Anodized AgCl Thin Film with AlGaIn/GaN HEMTs for Chloride Ion Detection," S.C. Hung, Y.L. Wang, B. Hicks, S.J. Pearton, F. Ren, J.W. Johnson, P. Rajagopal, J.C. Roberts, E.L. Piner, K.J. Linthicum, and G.C. Chia, *Electrochem. and Solid-State Lett.*, **11**(9), H241-H244 (2008). DOI: 10.1149/1.2938726
51. "Impact of AlN Interlayer on the Transport Properties of AlGaIn/GaN Heterostructures Grown on Silicon," S. Elhamri, W.C. Mitchel, R. Berney, M. Ahoujja, J.C. Roberts, P. Rajagopal, J.W. Cook, Jr., E.L. Piner, and K.J. Linthicum, *Phys. Stat. Sol. (C)* **5**, No. 6, 1962–1964 (2008). DOI: 10.1002/pssc.200778544
52. "Stimulated Emission and Lasing from an Al_{0.13}Ga_{0.87}N/GaN Double Heterostructure Grown on Silicon Substrate," F.S. Al-Ajmi, R.M. Kolbas, J.C. Roberts, P. Rajagopal, J.W. Cook, Jr., E.L. Piner, and K.J. Linthicum, *Appl. Phys. Lett.* **92**(2), 021118 (2008). DOI: 10.1063/1.2819614
53. "Enzymatic Glucose Detection Using ZnO Nanorods on the Gate Region of AlGaIn/GaN High Electron Mobility Transistors," B.S. Kang, H.T. Wang, F. Ren, S.J. Pearton, T.E. Morey, D.M. Dennis, J.W. Johnson, P. Rajagopal, J.C. Roberts, E.L. Piner, and K.J. Linthicum, *Appl. Phys. Lett.* **91**(25), 252103 (2007). DOI: 10.1063/1.2825574
54. "Electrical Detection of Kidney Injury Molecule-1 With AlGaIn/GaN High Electron Mobility Transistors," H.T. Wang, B.S. Kang, F. Ren, S.J. Pearton, J.W. Johnson, P. Rajagopal, J.C. Roberts, E.L. Piner, and K.J. Linthicum, *Appl. Phys. Lett.* **91**(22), 222101 (2007). DOI: 10.1063/1.2815931
55. "Prostate Specific Antigen Detection Using AlGaIn/GaN High Electron Mobility Transistors," B.S. Kang, H.T. Wang, T.P. Lele, Y. Tseng, F. Ren, S.J. Pearton, J.W. Johnson, P. Rajagopal, J.C. Roberts, E.L. Piner, and K.J. Linthicum, *Appl. Phys. Lett.* **91**(11), 112106 (2007). DOI: 10.1063/1.2772192
56. "Fast Electrical Detection of Hg(II) Ions With AlGaIn/GaN High Electron Mobility Transistors," H.-T. Wang, B.S. Kang, T.F. Chancellor, Jr., T.P. Lele, Y. Tseng, F. Ren, S.J. Pearton, J.W. Johnson, P. Rajagopal, J.C. Roberts, E.L. Piner, and K.J. Linthicum, *Appl. Phys. Lett.* **91**(4), 042114 (2007). DOI: 10.1063/1.2764554
57. "pH Sensor Using AlGaIn/GaN High Electron Mobility Transistors with Sc₂O₃ in the Gate Region," B.S. Kang, H.T. Wang, F. Ren, B.P. Gila, C.R. Abernathy, S.J. Pearton, J.W. Johnson, P. Rajagopal, J.C. Roberts, E.L. Piner, and K.J. Linthicum, *Appl. Phys. Lett.* **91**(1), 012110 (2007). DOI: 10.1063/1.2754637
58. "Room Temperature Laser Action from Multiple Bands in Photoexcited GaN Grown on a Silicon Substrate," F.S. Al-Ajmi, R.M. Kolbas, J.C. Roberts, P. Rajagopal, J.W. Cook, Jr.,

- E.L. Piner, and K.J. Linthicum, Appl. Phys. Lett. **90**(15), 151116 (2007). DOI: 10.1063/1.2722201
59. "Electrical Detection of Deoxyribonucleic Acid Hybridization with AlGa_N/Ga_N High Electron Mobility Transistors," B.S. Kang, S.J. Pearton, J.J. Chen, F. Ren, J.W. Johnson, R.J. Therrien, P. Rajagopal, J.C. Roberts, E.L. Piner, and K.J. Linthicum, Appl. Phys. Lett. **89**(12), 122102 (2006). DOI: 10.1063/1.2354491
60. "Reliability of Large Periphery Ga_N-on-Silicon HFETs," S. Singhal, T. Li, A. Chaudhari, A.W. Hanson, R. Therrien, J.W. Johnson, W. Nagy, J. Marguart, P. Rajagopal, J.C. Roberts, E.L. Piner, I.C. Kizilyalli, and K.J. Linthicum, Microelectronic and Reliability **46**(8), 1247-1253, (2006). DOI: 10.1016/j.microrel.2006.02.009
61. "Growth Temperature Dependence of Optical Modal Gain and Loss in Ga_N:Eu Active Medium on Si," J.H. Park, A.J. Steckl, P. Rajagopal, J.C. Roberts, and E. Piner, Opt. Express **14**(12), 5307-5312 (2006). DOI: 10.1364/OE.14.005307
62. "The Role of Barrier Layer on Ohmic Performance of Ti/Al-Based contact Metallizations on AlGa_N/Ga_N Heterostructures," F.M. Mohammed, L. Wang, I. Adesida, and E. Piner, J. Appl. Phys., **100**(2), 023708 (2006). DOI: 10.1063/1.2218766
63. "Gallium Nitride Surface Quantum Wells," J.F. Muth, X. Zhang, A. Cai, D. Fothergill, J.C. Roberts, P. Rajagopal, J.W. Cook, Jr., E.L. Piner, and K.J. Linthicum, Appl. Phys. Lett. **87**(19), 192117 (2005). DOI: 10.1063/1.2123396
64. "Capacitance Pressure Sensor Based on Ga_N High-Electron-Mobility-Transistor-on-Silicon Membrane," B.S. Kang, J. Kim, S. Jang, F. Ren, J.W. Johnson, R.J. Therrien, P. Rajagopal, J.C. Roberts, E.L. Piner, K.J. Linthicum, S.N.G. Chu, K. Baik, B.P. Gila, C.R. Abernathy, and S.J. Pearton, Appl. Phys. Lett. **86**(25), 253502 (2005). DOI: 10.1063/1.1952568
65. "A Magnetotransport Study of AlGa_N/Ga_N Heterostructures on Silicon," S. Elhamri, W.C. Mitchell, W.D. Mitchell, R. Berney, M. Ahoujja, J.C. Roberts, P. Rajagopal, T. Gehrke, E.L. Piner, and K.J. Linthicum, J. Electron. Materials, **34**(4), 444-449 (2005). DOI: 10.1007/s11664-005-0125-2
66. "MOCVD AlGa_N/Ga_N HFETs on Si: Challenges and Issues," P. Rajagopal, J.C. Roberts, J.W. Cook, Jr., J.D. Brown, E.L. Piner, and K.J. Linthicum, Mater. Res. Soc. Symp. Proc. **798**, 61-66 (2004).
67. "Pressure-Induced Changes in the Conductivity of AlGa_N/Ga_N High-Electron Mobility Transistor Membranes," B.S. Kang, S. Kim, F. Ren, J.W. Johnson, R.J. Therrien, P. Rajagopal, J.C. Roberts, E.L. Piner, K.J. Linthicum, S.N.G. Chu, K. Baik, B.P. Gila, C.R. Abernathy, and S.J. Pearton, Appl. Phys. Lett. **85**(14), 2962-2964 (2004). DOI: 10.1063/1.1800282
68. "An Electrical Characterization of a Two-Dimensional Electron Gas in Ga_N/AlGa_N on Silicon Substrates," S. Elhamri, S. Berney, W.C. Mitchell, W.D. Mitchell, J.C. Roberts, P. Rajagopal, T. Gehrke, E.L. Piner, and K.J. Linthicum, J. Appl. Phys., **95**(12), 7982-7989 (2004). DOI: 10.1063/1.1736327
69. "12 W/mm AlGa_N-Ga_N HFETs on Silicon Substrates," J.W. Johnson, E.L. Piner, A. Vescan, R. Therrien, P. Rajagopal, J.C. Roberts, J.D. Brown, S. Singhal, and K.J. Linthicum, IEEE Electron Device Lett., **25**(7), 459-461 (2004). DOI: 10.1109/LED.2004.831190

70. "A Novel Pt-AlGa_N/Ga_N Heterostructure Schottky Diode Gas Sensor on Si," G. Zhao, W. Sutton, D. Pavlidis, E.L. Piner, J. Schwank, and S. Hubbard, *IEICE Trans. on Electronics*, **Vol. E86-C**, No. 10, 2027-2031 (2003).
71. "Large-Area, Device Quality Ga_N on Si Using a Novel Transition Layer Scheme," P. Rajagopal, T. Gehrke, J.C. Roberts, J.D. Brown, T.W. Weeks, E.L. Piner, and K.J. Linthicum, *Mater. Res. Soc. Symp. Proc.* **743**, 3-8 (2003).
72. "DC, RF, and Microwave Noise Performance of AlGa_N-Ga_N Field Effect Transistors: Dependence of Aluminum Concentration," W. Lu, V. Kumar, E.L. Piner, and I. Adesida, *IEEE Trans. on Electron Devices*, **50**(4), 1069-1074 (2003). DOI: 10.1109/TED.2003.812083
73. "AlGa_N/Ga_N HFETs Fabricated on 100-mm Ga_N on Silicon (111) Substrates," J.D. Brown, Ric Borges, Edwin Piner, Andrei Vescan, Sameer Singhal, and Robert Therrien, *Solid-State Electron.*, **46**(10), 1535-1539 (2002). DOI: 10.1016/S0038-1101(02)00101-6
74. "A Comparative Study of Surface Passivation on AlGa_N/Ga_N HEMTs," W. Lu, V. Kumar, R. Schwindt, E. Piner, and I. Adesida, *Solid-State Electron.*, **46**(9), 1441-1444 (2002). DOI: 10.1016/S0038-1101(02)00089-8
75. "DC and Microwave Performance of Recessed-Gate Ga_N MESFETs Using ICP-RIE," C. Lee, W. Lu, E. Piner, and I. Adesida, *Solid-State Electron.*, **46**(5), 743-746 (2002). DOI: 10.1016/S0038-1101(01)00292-1
76. "DC, RF, and Microwave Noise Performance of AlGa_N/Ga_N High Electron Mobility Transistors on Sapphire Substrates," W. Lu, V. Kumar, R. Schwindt, E. Piner, and I. Adesida, *IEEE Trans. Microwave Theory Tech.*, **50**(11), 2499-2504 (2002).
77. "Recessed 0.25 μ m Gate AlGa_N/Ga_N HEMTs on SiC with High Gate-Drain Breakdown Voltage Using ICP-RIE," V. Kumar, W. Lu, F.A. Khan, R. Schwindt, E. Piner, and I. Adesida, *Electronics Letters*, **37**(24), 1483-1485 (2001). DOI: 10.1049/el:20010999
78. "Influence of Surface Processing and Passivation on Carrier Concentrations and Transport Properties in AlGa_N/Ga_N Heterostructures," X.Z. Dang, E.T. Yu, E.L. Piner, and B.T. McDermott, *J. Appl. Phys.* **90**(3), 1357 (2001). DOI: 10.1063/1.1383014
79. "Ga_N-Based Gunn Diodes: Their Frequency and Power Performance and Experimental Considerations," E. Alekseev, D. Pavlidis, W.E. Sutton, E. Piner, and J. Redwing, *IEICE Trans. on Electronics*, **Vol. E84-C**, No. 10, 1462-1469 (2001).
80. "Environmental Aging of Schottky Contacts to n-AlGa_N," E.D. Readinger, B.P. Luther, S.E. Mohny, and E.L. Piner, *J. Appl. Phys.* **89**(12), 7983 (2001). DOI: 10.1063/1.1370367
81. "Relaxation of InGa_N Thin Layers Observed by X-ray and Transmission Electron Microscopy Studies," Z. Liliental-Weber, M. Benamara, J. Washburn, J.Z. Domagala, J. Bak-Misiuk, E.L. Piner, J.C. Roberts, and S.M. Bedair, *J. of Electron. Materials*, **30**(4), 439-444 (2001). DOI: 10.1007/s11664-001-0056-5
82. "Generation and Properties of Semi-Insulating SiC Substrates," Shaoping Wang, Adrian Powell, Joan Redwing, Edwin Piner, and Adam W. Saxler, *Materials Sci. Forum Vol.*, **338-342** (2000) pp. 17-20. "Silicon Carbide and Related Materials – 1999" Eds. Calvin H. Carter, Jr., Robert P. Devaty, and Gregory S. Rohrer.
83. "AlGa_N/Ga_N MODFETs on Semi-Insulating SiC with 3 W/mm at 20 GHz," A. Vescan, R. Dietrich, A. Eieszt, A. Schurt, H. Leier, E.L. Piner, and J.M. Redwing, *Electronics Letters*, **36**(14), 1234-1236 (2000). DOI: 10.1049/el:20000898

84. "AlGaIn/GaN High Electron Mobility Transistor Structure Design and Effects on Electrical Properties," E.L. Piner, D.M. Keogh, J.S. Flynn, and J.M. Redwing, *MRS Internet J. Nitride Semicond. Res.* **5S1**, W4.4 (2000). DOI: 10.1557/S109257830000449X
85. "Microwave Noise Performance of AlGaIn/GaN HEMTs," A.T. Ping, E. Piner, J. Redwing, M.A. Khan, and I. Adesida, *Electronics Letters*, **36**(2), 175-176 (2000).
86. "Phase Separation and Ordering Coexisting in $\text{In}_x\text{Ga}_{1-x}\text{N}$ Grown by Metal Organic Chemical Vapor Deposition," M.K. Behbehani, E.L. Piner, S.X. Liu, N.A. El-Masry, and S.M. Bedair, *Appl. Phys. Lett.* **75**(15), 2202 (1999). DOI: 10.1063/1.124964
87. "Gate Recessing of GaN MISFETs Using Photoelectrochemical Wet Etching," A.T. Ping, D. Selvanathan, C. Youtsey, E. Piner, J. Redwing, and I. Adesida, *Electronics Letters*, **35**(24), 2140-2141 (1999). DOI: 10.1049/el:19991341
88. "Effect of Growth Temperature on Point Defect Density of Unintentionally Doped GaN Grown by Metalorganic Chemical Vapor Deposition and Hydride Vapor Phase Epitaxy," V.A. Joshkin, C.A. Parker, S.M. Bedair, J.F. Muth, I.K. Shmagin, R.M. Kolbas, E.L. Piner, and R.J. Molnar, *J. Appl. Phys.* **86**(1), 281 (1999). DOI: 10.1063/1.370727
89. "Optical Absorption, Raman, and Photoluminescence Excitation Spectroscopy of Inhomogeneous InGaIn Films," L. Robins, A.J. Paul, C.A. Parker, J.C. Roberts, S.M. Bedair, E.L. Piner, and N.A. El-Masry, *Mater. Res. Soc. Symp. Proc.* **537**, G3.22 (1999). DOI: 10.1557/PROC-537-G3.22
90. "Detection and Analysis of Phase Separation in Metalorganic Chemical Vapor Deposition InGaIn," E.L. Piner, N.A. El-Masry, S.X. Liu, and S.M. Bedair, *Mater. Res. Soc. Symp. Proc.* **482**, 125 (1998). DOI: 10.1557/PROC-482-125
91. "Phase Separation in InGaIn Grown by Metalorganic Chemical Vapor Deposition," N.A. El-Masry, E.L. Piner, S.X. Liu, and S.M. Bedair, *Appl. Phys. Lett.*, **72**(1), 40 (1998). DOI: 10.1063/1.120639
92. "Effect of Hydrogen on the Indium Incorporation in InGaIn Epitaxial Films," E.L. Piner, M.K. Behbehani, N.A. El-Masry, F.G. McIntosh, J.C. Roberts, and S.M. Bedair, *Appl. Phys. Lett.* **70**(4), 461 (1997). DOI: 10.1063/1.118181
93. "Impurity Dependence on Hydrogen and Ammonia Flow Rates in InGaIn Bulk Films," E.L. Piner, M.K. Behbehani, N.A. El-Masry, J.C. Roberts, F.G. McIntosh, and S.M. Bedair, *Appl. Phys. Lett.* **71**(14), 2023 (1997). DOI: 10.1063/1.119775
94. "Growth and Characterization of In-based Nitride Compounds," S.M. Bedair, F.G. McIntosh, J.C. Roberts, E.L. Piner, K.S. Boutros, and N.A. El-Masry, *J. Crystal Growth* **178**, 32 (1997). DOI: 10.1016/S0022-0248(97)00069-9
95. "Optical Memory Effect in GaIn Epitaxial Films," V.A. Joshkin, J.C. Roberts, F.G. McIntosh, S.M. Bedair, E.L. Piner, and M.K. Behbehani, *Appl. Phys. Lett.* **71**(2), 234 (1997). DOI: 10.1063/1.120414
96. "Growth and Characterization of In-Based Nitride Compounds and Their Double Heterostructures," V.A. Joshkin, J.C. Roberts, E.L. Piner, M.K. Behbehani, F.G. McIntosh, L. Wang, S. Lin, I. Shmagin, S. Krishnankutty, R.M. Kolbas, N.A. El-Masry, S.M. Bedair, *Mater. Res. Soc. Symp. Proc.* **468**, 13 (1997). DOI: 10.1557/PROC-468-13
97. "Epitaxial Deposition of GaInN and InN Using the Rotating Susceptor ALE System," F.G. McIntosh, E.L. Piner, J.C. Roberts, M.K. Behbehani, M.E. Aumer, N.A. El-Masry, and S.M. Bedair, *Appl. Surf. Sci.* **112**, 98-101 (1997). DOI: 10.1016/S0169-4332(96)00992-0

98. "Optical Transitions in InGaN/AlGaN Single Quantum Wells," K.C. Zeng, M. Smith, J.Y. Lin, H.X. Jiang, J.C. Roberts, E.L. Piner, F.G. McIntosh, S.M. Bedair, J. Zavada, J. Vac. Sci. Technol. B **15**(4), 1139-1143 (1997). DOI: 10.1116/1.589428
99. "A Model for Indium Incorporation in the Growth of InGaN Films," E.L. Piner, F.G. McIntosh, J.C. Roberts, K.S. Boutros, M.E. Aumer, V.A. Joshkin, N.A. El-Masry, S.M. Bedair, and S.X. Liu, Mater. Res. Soc. Symp. Proc. **449**, 85 (1997). DOI: 10.1557/PROC-449-85
100. "Stacked InGaN/AlGaN Double Heterostructures," J.C. Roberts, F.G. McIntosh, M.E. Aumer, E.L. Piner, V.A. Joshkin, S. Liu, N.A. El-Masry, and S.M. Bedair, Mater. Res. Soc. Symp. Proc. **449**, 1161 (1997). DOI: 10.1557/PROC-449-1161
101. "Growth and Properties of InGaN and AlInGaN Thin Films on (0001) Sapphire," E.L. Piner, F.G. McIntosh, J.C. Roberts, M.E. Aumer, V.A. Joshkin, S.M. Bedair, and N.A. El-Masry, MRS Internet J. Nitride Semicond. Res. **1**, 43 (1996). DOI: 10.1557/S1092578300002155
102. "Undoped and Doped GaN Thin Films Deposited on High-Temperature Monocrystalline AlN Buffer Layers on Vicinal and On-axis α (6H)-SiC(0001) Substrates via Organometallic Vapor Phase Epitaxy," T.W. Weeks, Jr., M.D. Bremser, K.S. Ailey, E.P. Carlson, W.G. Perry, E.L. Piner, N.A. El-Masry, and R.F. Davis, J. Mater. Res. **11**(4), 1081 (1996). DOI: 10.1557/JMR.1996.0126
103. "Growth and Characterization of AlInGaN/InGaN Heterostructures," J.C. Roberts, F.G. McIntosh, M. Aumer, V. Joshkin, K.S. Boutros, E.L. Piner, Y.W. He, N.A. El-Masry, and S.M. Bedair, Mater. Res. Soc. Symp. Proc. **423**, 341 (1996). DOI: 10.1557/PROC-423-341
104. "Growth and Characterization of AlInGaN Quaternary Alloys," F.G. McIntosh, K.S. Boutros, J.C. Roberts, S.M. Bedair, E.L. Piner, and N.A. El-Masry, Appl. Phys. Lett. **68**(1), 40 (1996). DOI: 10.1063/1.116749
105. "Low Temperature Growth of High Quality $\text{In}_x\text{Ga}_{1-x}\text{N}$ by Atomic Layer Epitaxy," K.S. Boutros, J.C. Roberts, F.G. McIntosh, E.L. Piner, N.A. El-Masry, and S.M. Bedair, Mater. Res. Soc. Symp. Proc. **395**, 213 (1996). DOI: 10.1557/PROC-395-213
106. "Growth of High Quality InGaN Films by Metalorganic Chemical Vapor Deposition," J.C. Roberts, F.G. McIntosh, K.S. Boutros, S.M. Bedair, M. Moussa, E.L. Piner, Y. He, and N.A. El-Masry, Mater. Res. Soc. Symp. Proc. **395**, 273 (1996). DOI: 10.1557/PROC-395-273
107. "AlGaInN Quaternary Alloy by MOCVD," F.G. McIntosh, E.L. Piner, K.S. Boutros, J.C. Roberts, Y. He, M. Moussa, N.A. El-Masry, and S.M. Bedair, Mater. Res. Soc. Symp. Proc. **395**, 219 (1996). DOI: 10.1557/PROC-395-219
108. "New Buffer Layers for GaN on Sapphire by Atomic Layer and Molecular Stream Epitaxy," E.L. Piner, Y.W. He, K.S. Boutros, F.G. McIntosh, J.C. Roberts, S.M. Bedair, and N.A. El-Masry, Mater. Res. Soc. Symp. Proc. **395**, 307 (1996). DOI: 10.1557/PROC-395-307
109. "High Quality InGaN Films by Atomic Layer Epitaxy," K.S. Boutros, F.G. McIntosh, J.C. Roberts, S.M. Bedair, E.L. Piner, and N.A. El-Masry, Appl. Phys. Lett. **67**(13), 1856 (1995). DOI: 10.1063/1.114355

3. Conference Proceedings

a. Refereed Conference Proceedings:

1. "Electrical Interface Characterization of Sacrificial SiN_x-Protected RTA in d-Mode GaN MIS-HEMTs with ALD Al₂O₃," Andres S. Aguirre Sanchez, Rajni Aggarwal, Rodolfo A. Rodriguez-Davila, Chadwin D. Young, Jonathan Anderson, Edwin L. Piner, and Manuel A. Quevedo, 56th IEEE Semiconductor Interface Specialists Conference, December 10-13, 2025, San Diego, CA, USA. DOI: _____
2. "WIP: Fabrication and Interface Trap Characterization of GaN MIS-HEMT Capacitors with PECVD SiN_x Gate Dielectrics for TID Evaluation," Andres S. Aguirre-Sanchez, Rajni Aggarwal, Chadwin D. Young, Edwin L. Piner, Jonathan Anderson, Manuel A. Quevedo, Latin American and Caribbean Consortium of Engineering Institutions Conference (LACCEI 2025), July 16-18, 2025, Mexico City, Mexico. DOI: _____
3. "The Study of Lateral Growth of Diamond Utilizing Precise Seeding," Florence A. Nugera, Dipa Devkota, Anupam KC, Anival Ayala, Ganesh Aryal, Chris Engdahl, Edwin L. Piner, and Mark W. Holtz, 67th Electronic Materials Conference (EMC 2025), June 25-27, 2025, Durham, NC, USA. DOI: _____
4. "Effect of Two-Step Methane Concentration on the Quality and Growth Rate of Diamond Film Grown by Hot-Filament Chemical Vapor Deposition (HFCVD)," D. Devkota, F. Nugera, J.W. Anderson, A. Ayala, A. K.C., B. Lamichhane, C. Engdahl, E.L. Piner, and M. Holtz, J. Electron. Packag., 24th IEEE Intersociety Conf. on Thermal and Thermomechanical Phenomena in Electronic Systems (ITherm) May 27-30, 2025, Dallas, TX, USA. DOI: 10.1109/ITHERM._____
5. "D-Mode GaN/AlGaIn/GaN MOS-HEMT Test Structures for Evaluating Gate Dielectric Impact on Device Performance," A.S. Aguirre-Sanchez, R. Aggarwal, C.D. Young, R.A. Rodriguez-Davila, J. Anderson, E.L. Piner, and M.A. Quevedo-Lopez, 2025 IEEE 37TH International Conference on Microelectronic Test Structures (ICMTS), March 24-27, 2025, San Antonio, TX, USA. DOI: _____
6. (Invited) "Characterizing CVD Diamond For Thermal Management of Electronics," Samuel Graham, Mark S. Goorsky, Kenneth Goodson, Mark Holtz, Edwin L. Piner, and Martin Kuball, 69th Annual Diamond Conference, July 9, 2018, University of Warwick, Warwick, UK.
7. "Chemical Vapor Deposition of Diamond on GaN Using MOCVD Grown In-Situ SiN_x as Dielectric Adhesion Layer," Anwar Siddique, Raju Ahmed, Jonathan Anderson, Mohammad Nazari, Luke Yeats, Graham Samuel, Mark Holtz and Edwin L. Piner, 12th International New Diamond and Nano Carbons Conference (NDNC 2018), Materials Research Society (MRS) May 24, 2018 Flagstaff, AZ, USA.
8. "High Resolution Selective Area Deposition of Hot Filament Chemical Vapor Deposited Diamond Films on Si, GaN, and AlN," Raju Ahmed, Anwar Siddique, Jonathan Anderson, Mohammad Nazari, Mark Holtz and Edwin L. Piner, 12th International New Diamond and Nano Carbons Conference (NDNC 2018), Materials Research Society (MRS) May 24, 2018 Flagstaff, AZ, USA.
9. "Structure of Diamond-Silicon Interfaces," J. Anderson, B.L. Hancock, M. Nazari, M.S. Goorsky, M. Holtz, and E.L. Piner, J. Electron. Packag., 16th IEEE Intersociety Conf. on Thermal and Thermomechanical Phenomena in Electronic Systems (ITherm) May 30 - June 2, 2017 Orlando, FL, USA. DOI: 10.1109/ITHERM.2017.7992498
10. "Implementations of CVD Diamond on GaN device layers: Optical Characterization of Wafer-scale Stress Uniformity" Bobby Hancock, Mohammad Nazari, Jon Anderson, Edwin Piner and Mark Holtz, 16th IEEE Intersociety Conf. on Thermal and Thermomechanical

Phenomena in Electronic Systems (ITherm) May 30 - June 2, 2017 Orlando, FL, USA. DOI: 10.1109/ITHERM.2017.8023954

11. (Invited) "Gallium Nitride on Silicon," Edwin L. Piner, ECS Transactions **77**(2), 95-98 (2017) Emerging Materials for Post CMOS Devices/Sensing and Applications 8, 231st ECS Meeting, New Orleans, LA, USA. DOI: 10.1149/07702.0095ecst
12. "High Voltage GaN Technology in a Silicon CMOS Environment: Challenges and Opportunities," H. Rusty Harris, Derek Johnson, Richard Hill, Edwin Piner, Man Wong, and Rinus Lee, 224th Electrochemical Society Meeting, October 30, 2013, San Francisco, CA, USA.
13. "Multi-Gate Device Architectures for GaN Based Power Switching Devices," Leo Mathew, Rajesh Rao, Edwin Piner, Jerry Fossum, and Sanjay Banerjee, 224th Electrochemical Society Meeting, October 30, 2013, San Francisco, CA, USA.
14. "Systematic Determination of Interface States and Charge Trapping Phenomenon in AlGaIn/GaN MOS-HEMT Gate Stacks," Derek W. Johnson, Iman Rezanezhad-Gatabi, Jung-Hwan Woo, Kyoung-Kuen Lee, Edwin L. Piner, and H. Rusty Harris, 10th International Conference on Nitride Semiconductors (ICNS-10), August 27, 2013, Washington, D.C., USA.
15. "Self-Protected GaN Power Devices with Reverse Drain Blocking and Forward Current Limiting Capabilities," Chunhua Zhou, Wanjun Chen, Edwin L. Piner, Kevin J. Chen, Proceedings of Power Semiconductor Devices & IC's (ISPSD), 2010 22nd International Symposium on Power Semiconductor Devices & ICs, June 6-10, 2010, Hiroshima, Japan.
16. "Breakdown Mechanism in AlGaIn/GaN HEMTs on Si Substrate," Bin Lu, E.L. Piner, and T. Palacios, 2010 Device Research Conference (DRC), June 21-23, 2010, South Bend, IN, USA. DOI: 10.1109/DRC.2010.5551907
17. "Coherent THz Electromagnetic Radiation Emission as a Shock Wave Diagnostic and Probe of Ultrafast Phase Transformations," E.J. Reed, M.R. Armstrong, K.Y. Kim, J.H. Glowina, M. Howard, E. Piner, and J. Roberts, Bulletin of the American Physical Society, 16th APS Topical Conference on Shock Compression of Condensed Matter, Vol. 54, Number 8, July 2, 2009, Nashville, TN, USA. DOI: 10.1063/1.3295222
18. "Coherent THz Electromagnetic Radiation Emission as a Diagnostic of Ultrafast Phase Transformations in Shocked CdSe," Evan Reed, Michael Armstrong, K.Y. Kim, James Glowina, William Howard, Edwin Piner and John Roberts, Bulletin of the American Physical Society, 16th APS Topical Conference on Shock Compression of Condensed Matter, Vol. 54, Number 8, July 2, 2009, Nashville, TN, USA.
19. "A New Mechanism for Observation of THz Acoustic Waves: Coherent THz Radiation Emission," E.J. Reed, M.R. Armstrong, K.-Y. Kim, J.M. Glowina, W.M. Howard, E.L. Piner, J.C. Roberts, Proc. SPIE **7214**, Ultrafast Phenomena in Semiconductors and Nanostructure Materials XIII, 72140P, February 6, 2009, San Jose, CA, USA. DOI: 10.1117/12.809326
20. "New Technologies for Improving the High Frequency Performance of AlGaIn/GaN High Electron Mobility Transistors," J.W. Chung, E.L. Piner, J.C. Roberts, and T. Palacios, International Conf. on Advances in Electronics and Microelectronics, 2008, ENICS '08, Sept 28 – Oct 4, 2008, Valencia, Spain, EU. DOI: 10.1109/ENICS.2008.36

21. "N-face GaN/AlGa_N Transistors Through Substrate Removal," J.W. Chung, E. Piner, T. Palacios, 2008 Device Research Conference (DRC), June 23-25 2008, Santa Barbara, CA, USA. DOI: 10.1109/DRC.2008.4800801
22. "A New and Better Method for Extracting the Parasitic Elements of On-Wafer GaN Transistors," A. Zarate-de Landa, J.E. Zuniga-Juarez, J.A. Reynoso-Hernandez, M.C. Maya-Sanchez, E.L. Piner, and K.J. Linthicum, IEEE/MTT-S International Microwave Symposium Digest, pp. 791-794, (2007). DOI: 10.1109/MWSYM.2007.380077
23. "High-Power and High-Voltage AlGa_N/Ga_N HEMTs-on-Si," Chris Park, Andrew Edwards, Pradeep Rajagopal, Wayne Johnson, Sameer Singhal, Allen Hanson, Quinn Martin, Edwin L. Piner, Kevin J. Linthicum, and Isik C. Kizilyalli, 2007 IEEE Compound Semiconductor Integrated Circuit Symposium (CSIC 2007) October 14-17, 2007, Portland, OR, USA. DOI: 10.1109/CSICS07.2007.11
24. "Device Degradation Phenomena in Ga_N HFET Technology: Status, Mechanisms, and Opportunities," E.L. Piner, S. Singhal, P. Rajagopal, R. Therrien, J.C. Roberts, T. Li, A.W. Hanson, J.W. Johnson, I.C. Kizilyalli, and K.J. Linthicum, International Electron Devices Meeting, (IEDM) pp. 1-4 (2006). DOI: 10.1109/IEDM.2006.346798
25. "150 W Ga_N-on-Si RF Power Transistor," W. Nagy, S. Singhal, R. Borges, J.W. Johnson, J.D. Brown, R. Therrien, A Chaudhari, A.W. Hanson, J. Riddle, S. Booth, P. Rajagopal, E.L. Piner, and K.J. Linthicum, 2005 IEEE MTT-S Int. Microwave Symp. Digest, June 2005.
26. "AlGa_N/Ga_N Heterostructure Field Effect Transistors Fabricated on 100mm Si/poly SiC Composite Substrates," J.C. Roberts, P. Rajagopal, J.W. Cook, R.J. Therrien, E.L. Piner, K.J. Linthicum, K.D. Hobart, M. Twigg, J. Mittereder, S. Binari, and F.J. Kub, Proceedings – Electrochemical Society 8th International Symp. on Semi. Wafer Bonding, pp. 151-156 (2005).
27. "25W X-band Ga_N on Si MMIC," D.M. Fanning, L.C. Witkowski, C. Lee, D.C. Dumka, H.Q. Tseng, P. Saunier, W. Gajewski, E.L. Piner, K.J. Linthicum, and J.W. Johnson, 2005 International Conf. on Compound Semi. Manufacturing Technologies (GaAs MANTECH) Digest, 2005.
28. "Material, Process, and Device Development of Ga_N-Based HFETs on Silicon Substrates," J.W. Johnson, J. Gao, K. Lucht, J. Williamson, C. Strautin, J. Riddle, R. Therrien, P. Rajagopal, J.C. Roberts, A. Vescan, J.D. Brown, A. Hanson, S. Singhal, R. Borges, E.L. Piner, and K.J. Linthicum, Proceedings – Electrochemical Society, Honolulu, HI, USA, vol. 6, pp. 405-419 (2004).
29. "Development of a Ga_N Transistor Process for Linear Power Applications," A.W. Hanson, R. Borges, J.D. Brown, J.W. Cook, Jr., T. Gehrke, J.W. Johnson, K. Linthicum, S. Peters, E. Piner, P. Rajagopal, J.C. Roberts, S. Singhal, R. Therrien, and A. Vescan, GaAs MANTECH (2004).
30. "Temperature Characterization of NDR in AlGa_N/Ga_N HFETs," H. Maher, C.R. Bolognesi, E.L. Piner, Proceeding of the 31st European Solid-State Device Research Conference, pp. 327-330, September 11-13, 2001. DOI: 10.1109/ESSDERC.2001.195267
31. "Optical and Structural Studies of Compositional Inhomogeneity in Strain-Relaxed Indium Gallium Nitride Films," L.H. Robins, J.T. Armstrong, R.B. Marinenko, M.D. Vaudin, C.E. Bouldin, J.C. Woicik, A.J. Paul, W.R. Thurber, K.E. Miyano, C.A. Parker, J.C. Roberts, S.M. Bedair, E.L. Piner, M.J. Reed, N.A. El-Masry, S.M. Donovan, and S.J. Pearton, Proceedings

of the IEEE 27th International Symp. On Compound Semi., pp. 507-512 (2000). DOI: 10.1109/ISCS.2000.947207

6. Book Reviews:

1. Materials Research Society, Spring 2012 Symposium G; Reliability and Materials Issues of III-V and II-VI Semiconductor Optical and Electron Devices and Materials II, Osamu Ueda, Mitsuo Fukuda, Kenji Shiojima, and Edwin Piner, April 9 – 13, 2012, San Francisco, CA, USA [co-sponsored by Japan Society of Applied Physics (JSAP)].
2. Materials Research Society, Fall 2009 Symposium B; Reliability and Materials Issues of Semiconductor Optical and Electrical Devices & Materials, Osamu Ueda, Mitsuo Fukuda, Steve Pearton, Edwin Piner, and Paolo Montangero, November 30 – December 4, 2009, Boston, MA, USA.
3. Materials Research Society, Spring 2008 Symposium C; Advances in GaN, GaAs, SiC and Related Alloys on Silicon Substrates, T. Li, J.M. Redwing, M. Mastro, E.L. Piner, and A. Dadgar, March 24-28, 2008, San Francisco, CA, USA. (Including symposium proceedings editing and publishing.)

7. Other Works in Print:

US Patents (equivalent international patents not listed):

- 12,176,221 – “Incorporating Semiconductors on a Polycrystalline Diamond Substrate,” Raju Ahmed and Edwin L. Piner, December 24, 2024.
- 10,903,076 – “Material selective regrowth structure and method,” Edwin L. Piner, January 26, 2021.
- 10,504,725 – “Material selective regrowth structure and method,” Edwin L. Piner, December 10, 2019.
- 10,177,229 – “Semiconductor material having a compositionally-graded transition layer,” T.W. Weeks, Jr., E.L. Piner, T. Gehrke, and K.J. Linthicum, January 8, 2019.
- 10,096,701 – “Gallium nitride materials and methods associated with the same” E.L. Piner, J.C. Roberts and P. Rajagopal, October 9, 2018.
- 9,461,119 – “Semiconductor structure with compositionally-graded transition layer,” T.W. Weeks, Jr., E.L. Piner, T. Gehrke, and K.J. Linthicum, October 4, 2016.
- 9,437,687 – “III-nitride based semiconductor structure,” T.W. Weeks, Jr., E.L. Piner, T. Gehrke, and K.J. Linthicum, September 6, 2016.
- 9,437,686 – “Gallium nitride devices with discontinuously graded transition layer,” T.W. Weeks, Jr., E.L. Piner, T. Gehrke, and K.J. Linthicum, September 6, 2016.
- 9,064,775 – “Gallium nitride semiconductor structures with compositionally-graded transition layer,” T.W. Weeks, Jr., E.L. Piner, T. Gehrke, and K.J. Linthicum, June 23, 2015.
- 8,937,335 – “Gallium nitride devices with aluminum nitride intermediate layer,” T.W. Weeks, Jr., E.L. Piner, T. Gehrke, and K.J. Linthicum, January 20, 2015.
- 8,928,035 – “Gallium nitride devices with gallium nitride alloy intermediate layer,” T.W. Weeks, Jr., E.L. Piner, T. Gehrke, and K.J. Linthicum, January 6, 2015.
- 8,928,034 – “Gallium nitride devices with aluminum nitride alloy intermediate layer,” T.W. Weeks, Jr., E.L. Piner, T. Gehrke, and K.J. Linthicum, January 6, 2015.

- 8,748,298 – “Gallium nitride materials and methods associated with the same” E.L. Piner, J.C. Roberts and P. Rajagopal, June 10, 2014.
- 8,592,862 – “Gallium nitride semiconductor structures with compositionally-graded transition layer,” T.W. Weeks, Jr., E.L. Piner, T. Gehrke, and K.J. Linthicum, November 26, 2013.
- 8,368,117 – “III-nitride materials including low dislocation densities and methods associated with the same,” E.L. Piner, J.C. Roberts, and P. Rajagopal, February 5, 2013.
- 8,344,417 – “Gallium nitride semiconductor structures with compositionally-graded transition layer” T.W. Weeks, Jr., E.L. Piner, T. Gehrke, and K.J. Linthicum, January 1, 2013.
- 8,343,824 – “Gallium nitride material processing and related device structures” E.L. Piner, J.W. Johnson, and J.C. Roberts, January 1, 2013.
- 8,105,921 – “Gallium nitride materials and methods” T.W. Weeks, Jr., E.L. Piner, T. Gehrke, and K.J. Linthicum, January 31, 2012.
- 8,026,581 – “Gallium nitride material devices including diamond regions and methods associated with the same,” A.W. Hanson and E.L. Piner, September 27, 2011.
- 7,994,540 – “Gallium nitride material transistors and methods associated with the same,” W.H. Nagy, R.M. Borges, J.D. Brown, A.D. Chaudhari, J.W. Cook, Jr., A.W. Hanson, J.W. Johnson, K.J. Linthicum, E.L. Piner, P. Rajagopal, J.C. Roberts, S. Singhal, R.J. Therrien, and A. Vescan, August 9, 2011.
- 7,791,106 – “Gallium nitride material structures including substrates and methods associated with the same,” E.L. Piner, P. Rajagopal, J.C. Roberts, and K.J. Linthicum, September 7, 2010.
- 7,687,827 – “III-nitride materials including low dislocation densities and methods associated with the same,” E.L. Piner, J.C. Roberts, and P. Rajagopal, March 30, 2010.
- 7,569,871 – “Gallium nitride material transistors and methods associated with the same,” W.H. Nagy, J.W. Johnson, E.L. Piner, P. Rajagopal, J.C. Roberts, S. Singhal, R.T. Therrien, A. Vescan, R.M. Borges, J.D. Brown, A.D. Chaudhari, J.W. Cook, Jr., A.W. Hanson, and K.J. Linthicum, August 4, 2009.
- 7,365,374 – “Gallium nitride material structures including substrates and methods associated with the same,” E.L. Piner, P. Rajagopal, J.C. Roberts, and K.J. Linthicum, April 29, 2008.
- 7,361,946 – “Semiconductor device-based sensors,” J.W. Johnson, E.L. Piner and K.J. Linthicum, April 22, 2008.
- 7,352,016 – “Gallium nitride material transistors and methods associated with the same,” W.H. Nagy, R.M. Borges, J.D. Brown, A.D. Chaudhari, J.W. Cook, Jr., A.W. Hanson, J.W. Johnson, K.J. Linthicum, E.L. Piner, P. Rajagopal, J.C. Roberts, S. Singhal, R.J. Therrien, and A. Vescan, April 1, 2008.
- 7,352,015 – “Gallium nitride materials and methods associated with the same” E.L. Piner, J.C. Roberts and P. Rajagopal, April 1, 2008.
- 7,339,205 – “Gallium nitride materials and methods associated with the same,” E.L. Piner, J.C. Roberts and P. Rajagopal, March 4, 2008.

- 7,247,889 – “III-nitride material structures including silicon substrates,” A.W. Hanson, J.C. Roberts, E.L. Piner, and P. Rajagopal, July 24, 2007.
- 7,135,720 – “Gallium nitride material transistors and methods associated with the same,” W.H. Nagy, R.M. Borges, J.D. Brown, A.D. Chaudhari, J.W. Cook, Jr., A.W. Hanson, J.W. Johnson, K.J. Linthicum, E.L. Piner, P. Rajagopal, J.C. Roberts, S. Singhal, R.J. Therrien, and A. Vescan, November 14, 2006.
- 6,727,531 / RE44,538 – “Indium gallium nitride channel high electron mobility transistors, and methods of making the same,” J.M. Redwing and E.L. Piner, April 27, 2004.
- 6,649,287 – “Gallium nitride materials and methods” T.W. Weeks, Jr., E.L. Piner, T. Gehrke, and K.J. Linthicum, November 18, 2003.
- 6,617,060 – “Gallium nitride materials and methods” T.W. Weeks, Jr., E.L. Piner, T. Gehrke, and K.J. Linthicum, September 9, 2003
- 6,611,002 – “Gallium nitride material devices and methods including backside vias” T.W. Weeks, Jr., E.L. Piner, R.M. Borges, and K.J. Linthicum, August 26, 2003.

B. Works not in Print

1. Papers Presented at Professional Meetings:

1. “Angled Plan View Sample Preparation of Diamond Thin Films for Multiscale Analysis,” Jonathan Anderson, Dipa Devkota, Florence Nugera, Mark Holtz, and Edwin Piner, Microscopy & Microanalysis 2025 Meeting (M&M 2025), July 30, 2025, Salt Lake City, UT, USA.
2. “Growth of Diamond within the Trenched AlN Surface and Study of the Induced Stress,” Ganesh Aryal, Jonathan W. Anderson, Florence Nugera, Mark W. Holtz, and Edwin L. Piner, American Physical Society Meeting, March 6, 2024, Minneapolis, MN, USA.
3. “Growth of Patterned Diamond Using High Seeding Density and Hot-Filament Chemical Vapor Deposition (HFCVD),” Florence A. Nugera, Dipa Devkota, Anupam KC, Anival Ayala, Ganesh Aryal, Chris Engdahl, Edwin L. Piner and Mark W. Holtz, Electronic Materials Conference, June 30, 2023, Santa Barbara, CA, USA.
4. “HAADF-STEM Study of Filament Material in Hot Filament CVD Diamond Films,” Jonathan Anderson, Raju Ahmed, Anwar Siddique, and Edwin L. Piner, Microscopy & Microanalysis 2019 Meeting (M&M 2019), August 4-8, 2019, Portland, OR, USA.
5. “Compositional Changes Occurring in GaN-on-Diamond Adhesion Layers,” Jonathan Anderson and Edwin L. Piner, 13th International Conference on Nitride Semiconductors 2019 (ICNS-13), July 7-12, 2019, Bellevue, WA, USA.
6. “AlGaIn/GaN HEMT 2DEG Impact by *in-situ* SiN_x Passivating Layer Stoichiometry Grown by MOCVD,” Anwar Siddique, Raju Ahmed, Jonathan Anderson and Edwin L. Piner, 13th International Conference on Nitride Semiconductors 2019 (ICNS-13), July 7-12, 2019, Bellevue, WA, USA.
7. “Characterizing CVD Diamond for Thermal Management of Electronics,” Samuel Graham, Mark Goorsky, Kenneth Goodson, Mark Holtz, Edwin L. Piner, and Martin Kuball, Diamond Conference 2018, July 12, 2018, Warwick, UK.
8. “Chemical Vapor Deposition of Diamond on GaN Using MOCVD Grown In Situ SiN_x as Dielectric Adhesion Layer,” Anwar Siddique, Raju Ahmed, Jonathan Anderson, Mohammad Nazari, Mark Holtz and Edwin Piner, 12th International New Diamond and Nano Carbons Conference (NDNC 2018), May 24, 2018, Flagstaff, AZ, USA.

9. "High Resolution Selective Area Deposition of Hot Filament Chemical Vapor Deposited Diamond Films on Si, AlN, and GaN," Raju Ahmed, Anwar Siddique, Jonathan Anderson, Mohammad Nazari, Mark Holtz and Edwin Piner, 12th International New Diamond and Nano Carbons Conference (NDNC 2018), May 24, 2018, Flagstaff, AZ, USA.
10. "Structure of Diamond-Silicon Interfaces," Jonathan Anderson, Logan Hancock, Mohammad Nazari, Mark Goorsky, Mark W. Holtz, and Edwin L. Piner, Sixteenth Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (ITherm), May 30, 2017, Lake Buena Vista, FL USA.
11. "Microstructure and Thermal Properties of CVD Diamond for Integration with GaN," Mark W. Holtz, B. Logan Hancock, Jonathan Anderson, Mohammad Nazari, Brian Squires, and Edwin L. Piner, International Semiconductor Device Research Symposium ISDRS 2016, December 7-9, 2016, Bethesda, MD, USA.
12. "UV Micro-Raman and Photoluminescence Stress-Mapping on a GaN HEMT-on-Diamond Wafer," B. Logan Hancock, Mohammad Nazari, Jonathan Anderson, Edwin Piner, and Mark Holtz, MRS Intl. Workshop on Nitride (IWN) Semiconductors, October 2016, Orlando, FL, USA.
13. "Morphology Study of Diamond Grown on GaN Using Near-Ultraviolet micro-Raman Technique," Mohammad Nazari, B. Logan Hancock, Jonathan Anderson, Alissa Savage, Edwin L. Piner, and Mark W. Holtz, MRS Intl. Workshop on Nitride (IWN) Semiconductors, October 2016, Orlando, FL, USA.
14. "Investigation of Stresses in GaN HEMT Layers on a Diamond Substrate using Micro-Raman Spectroscopy," B. Logan Hancock, M. Nazari, J. Anderson, E. Piner, M. Holtz, 2016 Compound Semiconductor Integrated Circuit Symposium (CSICS), October 23, 2016, Austin, TX, USA.
15. "Wafer Stress Mapping of GaN-on-Diamond by Micro-Raman Spectroscopy," B. Logan Hancock, Mohammad Nazari, Jonathan Anderson, Edwin L. Piner, and Mark W. Holtz, 40th Workshop on Compound Semiconductor Devices and Integrated Circuits – Europe (WOCSDICE), June 6, 2016, Aveiro, Portugal, EU.
16. "Implementations of CVD Diamond on GaN Device Layers: Optical Characterization of Wafer-scale Stress Uniformity," B.L. Hancock, M. Nazari, J. Anderson, E.L. Piner, and M.W. Holtz, Sixteenth Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (ITherm) IEEE, May 30, 2016, Orlando, FL, USA.
17. "DARPA Round Robin: Thermal Properties of Diamond," M. Holtz, E. L. Piner, S. Graham, M. Kuball, M. Goorsky, M. Asheghi, K. Goodson, Texas State University, Georgia Tech, Univ. Bristol, UCLA, Stanford Univ., Defense Innovation, Technology Acceleration Challenges, December 1, 2015, Austin, TX, USA.
18. "AlGaIn/GaN Heterojunction Field Effect Transistor Self-heating Investigation by UV and Visible Micro-Raman Spectroscopy," M. Nazari, B.L. Hancock, E.L. Piner, and M.W. Holtz, 2015 Workshop on Compound Semiconductor Devices and Integrated Circuits – Europe (WOCSDICE), June 9, 2015, Smolenice Castle, Slovakia, EU.
19. "Self-heating in an AlGaIn/GaN transistor studied by ultraviolet and visible micro-Raman scattering," M. Nazari, B.L. Hancock, E.L. Piner, and M.W. Holtz, Bulletin of the American Physical Society, APS March Meeting 2015, Volume 60, Number 1, March 4, 2015, San Antonio, TX, USA.

20. "Investigation of AlGaInN Microstructure," J.W. Anderson (ST), N. Simpson (ST), F. Ruiz, A. Ponce, O. Laboutin, Y. Cao, J.W. Johnson, and E.L. Piner, 32nd International Conference on the Physics of Semiconductors, August 14, 2014, Austin, TX, USA.
21. "Self-Heating in a Two-Dimensional Electron Gas at the Interface Between GaN & AlGaIn Studied by Ultraviolet & Visible Micro-Raman Scattering," M. Nazari, B.L. Hancock, E.L. Piner, J. Berg, and M.W. Holtz, 32nd International Conference on the Physics of Semiconductors, August 14, 2014, Austin, TX, USA.
22. "Junction Temperature & Electroluminescence Measurements in High Brightness Ultraviolet Light-Emitting Diodes," B.L. Hancock, E.L. Piner, J. Berg, and M.W. Holtz, 32nd International Conference on the Physics of Semiconductors, August 14, 2014, Austin, TX, USA.
23. "GaN High Electron Mobility Transistors," Jonathan W. Anderson (ST), Kyoung-Keun Lee, and Edwin L. Piner, Texas Section Joint APS/AAPT/SPS Spring 2012 Meeting, Session E2, Angelo State University, May 23, 2012, San Angelo, TX, USA.
24. "N-polar AlGaIn/GaN/AlGaIn DH-HEMT on Diamond Produced By Epi-Inverted Wafer Processing," E.L. Piner and J.C. Roberts, 9th International Conference on Nitride Semiconductors (ICNS-9), July 10-15, 2011, Glasgow, Scotland.
25. "GaN/Diamond AlGaIn/GaN/AlGaIn DH-HEMT Produced By Epi-Inverted Wafer Processing," E.L. Piner and J.C. Roberts, Electronic Materials Conference 2011, June 22-24, 2011, University of California, Santa Barbara, CA, USA.
26. "Top-Down Fabrication of N-face GaN/AlGaIn Nanowire Transistors," M. Azize, K. Ryu, E. Piner and T. Palacios, 38th International Symposium on Compound Semiconductors (ISCS 2011), May 22-26, 2011, Berlin, Germany.
27. "A Comparison of Mesa and Ion Implantation Isolation in AlGaIn/GaN HEMTs," H.F. Sun, D. Marti, S. Tirelli, A.R. Alt, E.L. Piner and C.R. Bolognesi, 38th International Symposium on Compound Semiconductors (ISCS 2011), May 22-26, 2011, Berlin, Germany.
28. "GaN/Diamond AlGaIn/GaN/AlGaIn HEMT – The Next Frontier," E.L. Piner and J.C. Roberts, IEEE Microwave Theory and Techniques Society International Microwave Symposium, High-Power-Density Packaging of Gallium Nitride Workshop (IEEE MTT-S 2010 Workshop WME IMS), May 23, 2010, Anaheim, CA, USA.
29. "Power Scaling of GaN/Diamond Double Heterostructure HEMT," E.L. Piner and J.C. Roberts, Government Microcircuit Applications & Critical Technology Conference (GOMACTech10), March 24, 2010, Reno, NV, USA.
30. "Giant Excitonic Transport in GaN/AlGaIn Surface Quantum Wells," Y.D. Glinka, S.V. Goupalov, T.V. Shahbazyan, H.O. Everitt, J. Roberts, P. Rajagopal, J. Cook, E. Piner, K. Linthicum, APS March Meeting 2010, Volume 55, Number 2, March 15, 2010, Portland, Oregon, USA.
31. "Atomic transformation pathways from THz radiation generated by shock-induced phase transformations," Evan Reed, Michael Armstrong, Ki-Yong Kim, James Glowina, Mike Howard, Edwin Piner, John Roberts APS March Meeting 2010, Volume 55, Number 2, March 18, 2010, Portland, Oregon, USA.
32. "Thermal Management in GaN HEMTs via Heterogeneous Integration Using Micro-transfer Printing with Advanced Thin Film Diamond Thermal Materials," J. Carlisle, H.

- Zeng, H. Kim, J.A. Rogers, E. Menard, S. Dooley, J. Jur, M. Johnson, and E. Piner, Materials Research Society Symposium; Diamond Electronics and Bioelectronics – Fundamentals to Applications III, November 30, 2009, Boston, MA, USA.
33. “Chloride Ion Detection with InN Gated AlGaIn/GaN High Electron Mobility Transistor,” B.H. Chu, H-W. Lin, S. Gwo, Y-L. Wang, S.J. Pearton, J.W. Johnson, P. Rajagopal, J.C. Roberts, E.L. Piner, K.J. Linthicum and F. Ren, Materials Research Society Symposium; III-Nitride Materials for Sensing, Energy Conversion, and Controlled Light-Matter Interactions, December 2, 2009, Boston, MA, USA.
 34. “Fast Detection of Perkinsus Marinus, a Prevalent Pathogen of Oysters and Clams from Sea Water,” Y.-L. Wang, B.H. Chu, K-H. Chen, C. Chang, T. Lele, G. Papdi, J. Coleman, B Sheppard, C. Dungan, S. Pearton, W. Johnson, K. Linthicum, P. Rajagopal, J. Roberts, E. Piner and F. Ren, Materials Research Society Symposium; III-Nitride Materials for Sensing, Energy Conversion, and Controlled Light-Matter Interactions, December 2, 2009, Boston, MA, USA.
 35. “Epi-Inverted Nitrogen-Polar GaN/Diamond AlGaIn/GaN/AlGaIn HEMT,” E.L. Piner and J.C. Roberts, 8th International Conference on Nitride Semiconductors (ICNS-8), October 18-23, 2009, Jeju, South Korea.
 36. “Seamless On-wafer Integration of GaN HEMTs and Si(100) MOSFETs,” J.W. Chung, E.L. Piner, and T. Palacios, 67th Device Research Conference, June 22-24, 2009, Penn State University, University Park, PA, USA.
 37. “Enhancement-Mode AlGaIn/GaN HEMTs with High Linearity Fabricated by Hydrogen Plasma Treatment,” B. Lu, O.I. Saadat, E.L. Piner, and T. Palacios, 67th Device Research Conference, June 22-24, 2009, Penn State University, University Park, PA, USA.
 38. “Epi-Inverted N-Face GaN/Diamond for AlGaIn/GaN/AlGaIn FETs,” E.L. Piner, J.W. Zimmer, J.C. Roberts, G. Chandler, and R.A. Sadler, 2009 Workshop on Compound Semiconductor Devices and Integrated Circuits – Europe (WOCSDICE), May 18-20, 2009, Malaga, Spain, EU.
 39. “c-erbB-2 sensing using AlGaIn/GaN High Electron Mobility Transistors for Breast Cancer Detection,” K. Chen, B. Kang, H. Wang, T. Lele, Y. Wang, C. Chang, S. Pearton, W. Johnson, P. Rajagopal, J. Roberts, E. Piner, K. Linthicum and F. Ren, 215th Electrochemical Society Meeting, May 25, 2009, San Francisco, CA, USA.
 40. “Novel AlGaIn/GaN Nitrogen-Face HEMT Structure for Thermally Enhanced Power Amplifiers,” E.L. Piner, J.C. Roberts, R.A. Sadler, and J. Gao, Government Microcircuit Applications & Critical Technology Conference (GOMACTech09), March 18, 2009, Orlando, FL, USA.
 41. “Gallium Nitride Light-Emitting Diodes Grown on Silicon Substrates,” E. Parra, J. Gilgen, A. Blake, D. Caselli, C. Durot, J. Mueller, Ig Tsong, J. Roberts, E. Piner, K. Linthicum, J. Cook, Jr., D. Koleske, and M. Crawford, Bulletin of the American Physical Society, 2008 Joint Fall Meeting of the Texas and Four Corners Sections of APS, AAPT, and Zones 13 and 16 of SPS, and the Societies of Hispanic & Black Physicists, Vol. **53**, Number 11, October 17, 2008; El Paso, TX, USA.
 42. “Influence of Passivation on the Transport Study of AlGaIn/GaN: A Focus on High T Hall Effect Characterization,” J. Daniel, S. Elhamri, R. Berney, M. Ahoujja, W. Mitchel, J. Roberts, P. Rajagopal, J. Cook, E. Piner, and K. Linthicum, Bulletin of the American

Physical Society, 2008 Spring Meeting of the Ohio-Region Section of APS, Vol. **53**, Number 3, March 28, 2008, Youngstown, OH, USA.

43. "AlGa_N Transition Layers on Si(111) Substrates – Observations of Microstructure and Impact on Material Quality," J.C. Roberts, J.W. Cook, Jr., P. Rajagopal, E.L. Piner, and K.J. Linthicum, Materials Research Society Symposium; Advances in GaN, GaAs, SiC and Related Alloys on Silicon Substrates, March 24-28, 2008, San Francisco, CA, USA.
44. "New Technologies for Improving the High Frequency Performance of AlGa_N/Ga_N High Electron Mobility Transistors," J.W. Chung, E.L. Piner, J.C. Roberts, and T. Palacios, 2008 International Conf. on Advances in Electronics and Microelectronics, ENICS '08, September 28 – October 4, 2008, Valencia, Spain, EU.
45. "Gallium Nitride HEMT Development for Decade-Wide Amplifier Applications," A. Balistreri, J. Jimenez, M.-Y. Kao, C. Lee, P. Saunier, P. Chao, K. Chu, A. Immorlica, A. Souzis, I. Eliashevich, S. Guo, J. Ditri, P. Bronecke, E. Piner, J. del Alamo, J. Joh, and M. Shur, Government Microcircuit Applications & Critical Technology Conference (GOMACTech08), March 17-19, 2008, Las Vegas, NV, USA.
46. "Application of Highly Reliable Wide Bandgap GaN on Silicon MMIC to Weapon Data Linkes," D. Punatar, D. Landt, and E.L. Piner, Defense Manufacturing Conference (DMC 2007), December 3-6, 2007, Las Vegas, NV, USA.
47. "A Method to Optimize Transport Properties of AlGa_N/Ga_N on Silicon," J.D. Daniel, S. Elhamri, R. Berney, M. Ahoujja, W.C. Mitchel, J.C. Roberts, P. Rajagopal, J.W. Cook, Jr., E.L. Piner, and K.J. Linthicum, Bulletin of the American Physical Society, 2007 Ohio Section APS/SOS/AAPT Joint Fall Meeting, Vol. **52**, Number 15, October 19, 2007, Oxford, OH, USA.
48. "A New and Better Method for Extracting the Parasitic Elements of On-Wafer Ga_N Transistors," A. Zarate-de Landa, J.E. Zuniga-Juarez, J.A. Reynoso-Hernandez, M.C. Maya-Sanchez, E.L. Piner, and K.J. Linthicum, 2007 IEEE/MTT-S International Microwave Symposium, June 3-8, 2007, Honolulu, HI, USA.
49. "Gallium Nitride for Wide-Band Applications," A. Balistreri, J. Jimenez, M.Y. Kao, C. Lee, P. Saunier, P.C. Chao, K. Chu, A. Immorlica, A. Souzis, I. Eliashevich, S. Guo, P. Bronecke, E. Piner, J. del Alamo, J. Joh, and M. Shur, Government Microcircuit Applications & Critical Technology Conference (GOMACTech07), March 19-22, 2007, Lake Buena Vista, FL, USA.
50. "Characterization of Ga_N/Si Using Capacitance Spectroscopies," S.R. Smith, J.C. Roberts, P. Rajagopal, J.W. Cook E.L. Piner, K.J. Linthicum, and S. Elhamri, Materials Research Society Symposium; Advances in III-V Nitride Semiconductor Materials and Devices, November 27 – December 1, 2006, Boston, MA, USA.
51. "Ga_N-on-Si Reliability: A Comparative Study Between Process Platforms," S. Singhal, A. Chaudhari, A.W. Hanson, J.W. Johnson, R. Therrien, P. Rajagopal, T. Li, C. Park, A.P. Edwards, E.L. Piner, I.C. Kizilyalli, and K.J. Linthicum, Microelectronics Reliability: 2006 Reliability of Compound Semiconductor (ROCS) Workshop, October 30, 2006, San Antonio, TX, USA.
52. "Affordable High Power AlGa_N/Ga_N HEMTs on 4-inch 3C poly-SiC Substrates," G. Augustine, J.D. Hartman, E.C. Elvey, E.L. Piner, J.C. Roberts, K.J. Linthicum, H.G. Henry, R.C. Brooks, and R.C. Clarke, Government Microcircuit Applications & Critical Technology Conference (GOMACTech06), March 20-23, 2006, San Diego, CA, USA.

53. "Nonequilibrium Carrier Dynamics in AlGa_N/Ga_N Surface Quantum Wells Monitored by Time-Resolved Photoluminescence Spectroscopy," Y. D. Glinka, J. V. Foreman, W. Davenport, H. O. Everitt, X. Zhang, I. P. Wellnious, J. F. Muth, J. Roberts, P. Rajagopal, J. Cook, E. Piner, and K. Linthicum, Bulletin of the American Physical Society, 2006 APS March Meeting, March 13, 2006, Baltimore, MD, USA.
54. "Reliability of Large Periphery GaN-on-Silicon HFETs," S. Singhal, T. Li, A. Chaudhari, A.W. Hanson, R. Therrien, J.W. Johnson, W. Nagy, J. Marguart, P. Rajagopal, J.C. Roberts, E.L. Piner, I.C. Kizilyalli, and K.J. Linthicum, Microelectronics Reliability: 2005 Reliability of Compound Semiconductor (ROCS) Workshop, October 30, 2005, Palm Springs, CA, USA.
55. "AlGa_N/Ga_N HEMTs on Silicon: Reliability, Performance, and Affordability," Edwin L. Piner, 2005 Radio Frequency Module Manufacturing Workshop, August 23-24, 2005, Redstone Arsenal, Huntsville, AL, USA.
56. "150 W GaN-on-Si RF Power Transistor," W. Nagy, S. Singhal, R. Borges, J.W. Johnson, J.D. Brown, R. Therrien, A. Chaudhari, A.W. Hanson, J. Riddle, S. Booth, P. Rajagopal, E.L. Piner, and K.J. Linthicum, 2005 IEEE MTT-S International Microwave Symposium, June 12-17, 2005, Long Beach, CA, USA.
57. "AlGa_N/Ga_N Heterostructure Field Effect Transistors Fabricated on 100mm Si/poly SiC Composite Substrates," J.C. Roberts, P. Rajagopal, J.W. Cook, R.J. Therrien, E.L. Piner, K.J. Linthicum, K.D. Hobart, M. Twigg, J. Mittereder, S. Binari, and F.J. Kub, Electrochemical Society 8th International Symposium on Semiconductor Wafer Bonding, May 15-20, 2005, Quebec, Canada.
58. "25W X-band GaN on Si MMIC," D.M. Fanning, L.C. Witkowski, C. Lee, D.C. Dumka, H.Q. Tseng, P. Saunier, W. Gajewski, E.L. Piner, K.J. Linthicum, and J.W. Johnson, 2005 International Conference on Compound Semiconductor Manufacturing Technology (CS MANTECH), April 11-14, 2005, New Orleans, LA, USA.
59. "Development of a GaN Transistor Process for Linear Power Applications," A.W. Hanson, R. Borges, J.D. Brown, J.W. Cook, Jr., T. Gehrke, J.W. Johnson, K. Linthicum, S. Peters, E. Piner, P. Rajagopal, J.C. Roberts, S. Singhal, R. Therrien, and A. Vescan, 2004 International Conference on Compound Semiconductor Manufacturing Technology (GaAs MANTECH), May 2004, Miami, FL, USA.
60. "Material, Process, and Device Development of GaN-Based HFETs on Silicon Substrates," J.W. Johnson, J. Gao, K. Lucht, J. Williamson, C. Strautin, J. Riddle, R. Therrien, P. Rajagopal, J.C. Roberts, A. Vescan, J.D. Brown, A. Hanson, S. Singhal, R. Borges, E.L. Piner, and K.J. Linthicum, Electrochemical Society Meeting, October 5, 2004, Honolulu, HI, USA.
61. "MOCVD AlGa_N/Ga_N HFETs on Si: Challenges and Issues," P. Rajagopal, J.C. Roberts, J.W. Cook, Jr., J. Brown, E. Piner, and K. Linthicum, Materials Research Society Symposium; GaN and Related Alloys – 2003, December 1-5, 2003, Boston, MA, USA.
62. "Stress and Strain Management of III-Nitride Epitaxy on (111) Silicon," E.L. Piner, P. Rajagopal, J.C. Roberts, T. Gehrke, T.W. Weeks, Jr., and K.J. Linthicum, 2003 Lawrence Symposium on Critical Issues in Epitaxy, October 9-11, 2003, Tempe, AZ, USA.
63. "Large-Area, Device Quality GaN on Si Using a Novel Transition Layer Scheme," P. Rajagopal, T. Gehrke, J.C. Roberts, J.D. Brown, T.W. Weeks, E.L. Piner, and K.J.

Linthicum, Materials Research Society Symposium; GaN and Related Alloys – 2002, December 2-6, 2002, Boston, MA, USA.

64. “Gallium Nitride on Silicon,” R. Borges, E. Piner, A. Vescan, J.D. Brown, S. Singhal, and R. Therrien, 2001 International Semiconductor Device Research Symposium (ISDRS), December 5-7, 2001, Washington, DC, USA.
65. “Optical and Structural Studies of Compositional Inhomogeneity in Strain-Relaxed Indium Gallium Nitride Films,” L.H. Robins, J.T. Armstrong, R.B. Marinenko, M.D. Vaudin, C.E. Bouldin, J.C. Woicik, A.J. Paul, W.R. Thurber, K.E. Miyano, C.A. Parker, J.C. Roberts, S.M. Bedair, E.L. Piner, M.J. Reed, N.A. El-Masry, S.M. Donovan, and S.J. Pearton, 2000 IEEE International Symposium On Compound Semiconductors, October 2-5, 2000, Monterey, CA, USA.
66. “A Study of On-State and Off-State Breakdown Voltages in GaN MESFETs,” A. Kuliev, C. Lee, W. Lu, E. Piner, S.R. Bahl, and I. Adesida, 2000 IEEE/Cornell Conference on High Performance Devices, August 7-9, 2000, Ithaca, NY, USA.
67. “Recessed Gate GaN MESFET Using ICP-RIE for High Temperature Microwave Applications,” C. Lee, W. Lu, E. Piner, and I. Adesida, 58th Device Research Conference, June 19-21, 2000, Denver, CO, USA.
68. “Phase Separation and Ordering in InGaN Grown by MOCVD,” N.A. El-Masry, E.L. Piner, S.X. Liu, and S.M. Bedair, 10th International Conf on Semiconducting and Insulating Materials (IEEE, SIMC-X) June 1998, Berkeley, CA, USA.
69. “Detection and Analysis of Phase Separation in Metalorganic Chemical Vapor Deposition InGaN,” E.L. Piner, N.A. El-Masry, S.X. Liu, and S.M. Bedair, Materials Research Society Symposium; Nitride Semiconductors, December 1-5, 1997, Boston, MA, USA.
70. “New Buffer Layers for GaN on Sapphire by Atomic Layer and Molecular Stream Epitaxy,” E.L. Piner, Y.W. He, K.S. Boutros, F.G. McIntosh, J.C. Roberts, S.M. Bedair, and N.A. El-Masry, Materials Research Society Symposium; Gallium Nitride and Related Materials, November 27 - December 1, 1995, Boston, MA, USA.

2. Invited Talks, Lectures, and Presentations:

1. *INVITED Short Course* “III-V Epitaxial & Thin Film Deposition, Processes and Opportunities,” Edwin L. Piner, IEEE BiCMOS and Compound Semiconductor Integrated Circuits and Technology Symposium, October 27, 2024, Ft Lauderdale, FL, USA.
2. *INVITED* “Heterogeneous Integration of Ultrawide Bandgap III-Nitrides and Diamond,” Edwin L. Piner & Mark W. Holtz, 244th Electrochemical Society Meeting, State-of-the-Art Program on Compound Semiconductors 66 (SOTAPOCS 66), October 9, 2023, Gothenburg, Sweden, EU.
3. *INVITED* “III-Nitrides and Diamond Integration,” Edwin L. Piner, UT-Dallas MSE Colloquium Series, September 9, 2022, Dallas, TX, USA.
4. *INVITED* “III-Nitrides and Diamond Integration, Challenges and Opportunities,” Edwin L. Piner, Summer School of Information Engineering (SSIE) – “Silvano Pupolin”, IEEE Italy Section PhD Summer School, July 13, 2022, Bressanone, Italy, EU.
5. *SEMINAR* “GaN / Diamond: Combination Challenges and Heterointerface Optimization,” Edwin L. Piner, Trinity University, February 25, 2020, San Antonio, TX, USA.

6. *SEMINAR* “Heterointerface Science of Gallium Nitride / Diamond,” Edwin L. Piner, Lamar University, April 5, 2019, Beaumont, TX, USA.
7. *INVITED* “Gallium Nitride on Silicon,” Edwin L. Piner, 231st Electrochemical Society Meeting, Emerging Materials for Post CMOS Devices/Sensing and Applications 8 Symposium, May 30, 2017, New Orleans, LA, USA.
8. *SEMINAR* “GaN-on-Silicon for RF PAs: The brief history and lessons going forward,” Edwin L. Piner, Infineon Technologies AG, May 12, 2015, Villach, Austria.
9. *SEMINAR SERIES* Edwin L. Piner, Infineon Technologies AG, May 21 & 22, 2014, Villach, Austria.
 - a. “Nucleation of III-Nitrides on Silicon – Key challenges for initiating III-nitride epitaxy on silicon”
 - b. “Crystal Defects and Device Functionality Impacts”
 - c. “AlGaIn/GaN HEMT Optimization”
 - d. “Epitaxial Influences on Reliability”
10. *SEMINAR* “GaN on Si: Material Challenges and Opportunities” Edwin L. Piner, SunEdison, May 1, 2014, St. Louis, MO, USA
11. *SEMINAR* “GaN / Diamond: Optimizing the Combination to Take Advantage of Material Properties,” Edwin L. Piner, Trinity University, September 18, 2012, San Antonio, TX, USA.
12. *INVITED* “Fabrication of AlGaIn/GaN/AlGaIn Double Heterostructure HEMT on Diamond,” Edwin L. Piner, 220th Electrochemical Society Meeting, State-of-the-Art Program on Compound Semiconductors 53 (SOTAPOCS 53) Symposium, October 9-14, 2011, Boston, MA, USA.
13. *INVITED* “Integration of Gallium Nitride and Silicon: From Devices to Diamond,” Edwin L. Piner, IEEE International Silicon-on-Insulator (SOI) Conference, October 3-6, 2011, Tempe, AZ, USA. DOI: 10.1109/SOI.2011.6081705
14. *SEMINAR* “GaN-on-Si: Truth is Stranger Than Fiction,” Edwin L. Piner, University of Bristol, July 18, 2011, Bristol, United Kingdom.
15. *SEMINAR* “GaN-on-Si: Truth is Stranger Than Fiction,” Edwin L. Piner, RWTH-Aachen – University of Aachen, May 26, 2011, Aachen, Germany.
16. *INVITED* “GaN-on-Si HEMTs: From Device Technology to Product Insertion,” W. Johnson, S. Singhal, A. Hanson, R. Therrien, A. Chaudhari, W. Nagy, P. Rajagopal, Q. Martin, T. Nichols, A. Edwards, J. Roberts, E. Piner, I. Kizilyalli, and K. Linthicum, Materials Research Society Symposium; Advances in GaN, GaAs, SiC and Related Alloys on Silicon Substrates, March 24-28, 2008, San Francisco, CA, USA.
17. *INVITED* “Progress in GaN Electronic Devices and Timeline For the Completion of the Overriding Vision of GaN Electronics: A USA Perspective,” Edwin L. Piner, 2007 Workshop on Compound Semiconductor Devices and Integrated Circuits – Europe (WOCSDICE), May 23, 2007, Venice, Italy, EU.
18. *INVITED* “Qualification and Reliability of a GaN Process Platform,” S. Singhal, A.W. Hanson, A. Chaudhari, P. Rajagopal, T. Li, J.W. Johnson, W. Nagy, R. Therrien, C. Park, A.P. Edwards, E.L. Piner, K.J. Linthicum, and I.C. Kizilyalli, 2007 International Conference on Compound Semiconductor Manufacturing Technology (CS ManTech), May 15, 2007, Austin, TX, USA.
19. *INVITED* “Device Degradation Phenomena in GaN HFET Technology: Status, Mechanisms, and Opportunities,” E.L. Piner, S. Singhal, P. Rajagopal, R. Therrien, J.C. Roberts, T. Li, A.W. Hanson, J.W. Johnson, I.C. Kizilyalli, and K.J. Linthicum, 2006

International Electron Devices Meeting (IEDM), December 11-13, 2006, San Francisco, CA, USA.

20. *INVITED* “GaN on Silicon For High Power and High Frequency Electronics,” Edwin L. Piner, 2001 Workshop on Compound Semiconductor Devices and Integrated Circuits – Europe (WOCSDICE), May 29, 2001, Cagliari, Italy, EU.

3. Consultancies:

Consulting for two private companies working in III-Nitride materials and devices (2010 – present) and several legal firms as an expert regarding patent infringement in electronic materials and processing (2011 – present), semiconductor device fabrication (2015 – present), and plasma physics and applications (2014 – 2016).

- Lexington Luminance, LLC & Katz, PLLC, 2016-present
- Confidentiality restricts publication of other entities

Professional Services & Litigation Testimony, 2013-present

Technical Consultant, Infineon Technologies, Austria, EU.

TRUSTEES OF BOSTON UNIVERSITY v. EVERLIGHT ELECTRONICS CO., LTD. ET AL, No. 12-cv-11935-PBS, 2013 U.S. Dist. Massachusetts.

TRUSTEES OF BOSTON UNIVERSITY v. SEOUL SEMICONDUCTOR CO., LTD., ET AL, No. 12-cv-11938-PBS, 2013 U.S. Dist. Massachusetts.

TRUSTEES OF BOSTON UNIVERSITY v. EPISTAR CORPORATION, No. 12-cv-12326-PBS, 2013 U.S. Dist. Massachusetts.

TRUSTEES OF BOSTON UNIVERSITY v. LITE-ON, INC., ET AL, No. 12-cv-12330-PBS, 2013 U.S. Dist. Massachusetts.

TRUSTEES OF BOSTON UNIVERSITY v. SAMSUNG ELECTRONICS CO., LTD., ET AL, No. 13-cv-10659-PBS, 2013 U.S. Dist. Massachusetts.

TRUSTEES OF BOSTON UNIVERSITY v. AMAZON.COM, INC., No. 13-cv-11097-PBS, 2013 U.S. Dist. Massachusetts.

TRUSTEES OF BOSTON UNIVERSITY v. ARROW ELECTRONICS, INC., ET AL, No. 13-cv-11105-PBS, 2013 U.S. Dist. Massachusetts.

TRUSTEES OF BOSTON UNIVERSITY v. APPLE, INC., No. 13-cv-11575-PBS, 2013 U.S. Dist. Massachusetts.

TRUSTEES OF BOSTON UNIVERSITY v. HEWLETT-PACKARD COMPANY, No. 13-cv-11832-PBS, 2013 U.S. Dist. Massachusetts.

TRUSTEES OF BOSTON UNIVERSITY v. VYRIAN, INC., No. 13-cv-11963-PBS, 2013 U.S. Dist. Massachusetts.

LEXINGTON LUMINANCE LLC, v. GOOGLE, INC., No. 1:12-cv-12218-RGS, 2016 U.S. Dist. Massachusetts.

LG INNOTEK CO., LTD., v. LEXINGTON LUMINANCE LLC, IPR2017-00052, 2017 U.S. Patent Office.

SAMSUNG ELECTRONICS CO., LTD., v. LEXINGTON LUMINANCE LLC, IPR2017-00539, 2017, U.S. Patent Office.

SAMSUNG ELECTRONICS CO., LTD., v. LEXINGTON LUMINANCE LLC, IPR2017-00540, 2017, U.S. Patent Office.

TCL CORPORATION, TCL MULTIMEDIA TECHNOLOGY HOLDINGS, LTD., AND TTE TECHNOLOGY, INC., v. LEXINGTON LUMINANCE LLC, IPR2017-01780, 2017, U.S. Patent Office.

NITRIDE SEMICONDUCTORS LTD. CO., v. RAYVIO CORPORATION, No. 5:17-cv-02952-EJD, 2018 U.S. Dist. Northern California, San Jose Division. [Testified as an expert by deposition.]

ACORN SEMI, LLC, v. SAMSUNG ELECTRONICS CO., LTD, ET AL., No. 2:19-CV-347-JRG, 2021 U.S. Dist. Eastern Texas. [Testified as an expert at trial and by deposition.]

NITRIDE SEMICONDUCTORS LTD. CO., v. DIGI-KEY CORPORATION D/B/A DIGI-KEY ELECTRONICS, No. 17-cv-4359 (JRT/LIB), 2022 U.S. Dist. Minnesota.

NITRIDE SEMICONDUCTORS LTD. CO., v. LITE-ON TECHNOLOGY CORPORATION, LITE-ON TECHNOLOGY USA, INC., LITE-ON, INC., and LITE-ON TRADING USA, INC., No. 6:21-cv-00183-ADA-DTG, 2022 U.S. Dist. Western Texas.

CRYSTAL IS, INC., v. NITRIDE SEMICONDUCTORS LTD. CO., Case No. 1:21-cv-606 (GTS/DJS), 2022 U.S. Dist. Northern New York. [Testified as an expert by deposition.]

DAEDALUS PRIME LLC, v. SAMSUNG ELECTRONICS CO., LTD., SAMSUNG ELECTRONICS AMERICA, INC., SAMSUNG SEMICONDUCTOR, INC., and SAMSUNG AUSTIN SEMICONDUCTOR, LLC, No. 2:22-cv-00353-JRG, 2022 U.S. Dist. Eastern Texas.

LEXINGTON LUMINANCE LLC, v. BULBRITE INDUSTRIES, INC., No. 2:22-cv-03787-JMV-JSA, 2023 U.S. Dist. New Jersey.

INFINEON TECHNOLOGIES AG v. INNOSCIENCE (SUZHOU) TECHNOLOGY COMPANY, LTD., Investigation No. 337-TA-1414, 2024 U.S. International Trade Commission, Washington, D.C. [Testified as an expert by deposition.]

CERTAIN FOREIGN-FABRICATED SEMICONDUCTOR DEVICES, PRODUCTS CONTAINING THE SAME, AND COMPONENTS THEREOF, Investigation No. 337-TA-1443, 2025 U.S. International Trade Commission, Washington, D.C. [Testified as an expert by deposition.]

4. Workshops:

- 9th International Conference on Nitride Semiconductors (ICNS-9), “What is the Next Big Thing in III-Nitride Electronic Devices?” Workshop Panel Presenter, July 10-15, 2011, Glasgow, Scotland, UK. *INVITED*
- IEEE Microwave Theory and Techniques Society International Microwave Symposium (IEEE MTT-S 2010 IMS), “High-Power-Density Packaging of Gallium Nitride” Workshop Panel Presenter, May 23-28, 2010, Anaheim, CA, USA. *INVITED*
- 8th International Conference on Nitride Semiconductors (ICNS-8), “The Future of GaN Electronics” Panel Expert, October 18-23, 2009, Jeju, South Korea. *INVITED*

C. Grants and Contracts

1. Funded External Grants and Contracts:

2025-2030, NSF Research Center, “CREST Center for Ultrawide Bandgap Semiconductor Device Materials,” \$7,500,000, E. Piner (Center Director) and A. Haque, Y. Miyahara and D. Valles (co-PIs)

2024-2025, Atomera Incorporated, “Utilization of Atomera MST for GaN Growth on Silicon-based Substrates,” \$43,886 & \$99,389, E. Piner (PI) and J. Anderson

2023-2025, Texas Instruments – Dallas (Gift), “Studies of Doped GaN,” \$140,000, E. Piner

2023-2027, Army Research Office HBCU/MI, “Lateral Heterogeneous Integration of Ultrawide Bandgap AlGaN and Diamond,” \$800,000, E. Piner (PI) and M. Holtz

2021-2023, Texas Instruments – Dallas (Gift), “Kinetics of Defect Formation in GaN on Si Processing” \$135,000 (\$90k+\$45k), E. Piner

2020-2021, Texas Instruments – Dallas (Gift), “MOCVD Growth of AlN on Silicon,” \$146,000, E. Piner

2020-2023, Army Research Office HBCU/MI, “Heterogeneous Integration of Diamond and Ultrawide-Bandgap Semiconductors for Fundamental Phonon and Electron Transport Studies,” \$660,000, E. Piner (PI) and M. Holtz

2020-2021, Texas State Univ REP, “Improving Thermal Management in GaN HEMTs via Simulation of TDTR Characterization,” \$16,000, E. Piner (PI) and L. Scolfaro (co-PI)

2018-2021, NSF EPMD, “Integrated Selective Growth of Diamond and GaN for Thermal Management,” \$410,000, E. Piner (PI) and M. Holtz

2017-2019, Army HBCU/MI, “Integrated Characterization of Electronic Devices and Materials for Research and Education” \$332,086, J. Li (PI), and E. Piner, W. Geerts, N. Theodoropoulou, R. Droopad, T. Myers, M. Chen, Q. Yu, A. Zakhidov, M. Holtz, and C. Smith (senior collaborators)

2016-2017, Army HBCU/MI, “Scanning Probe Microscope for Materials Research and Education,” \$358,558, A. Zakhidov (PI), and T. Myers, B. Beall, E. Piner, W. Geerts, N. Theodoropoulou, T. Betancourt, and M. Holtz (senior collaborators)

2016, Army High School / Undergraduate Research Participation, “The Fundamental Science of GaN-Diamond Heterointerface Thermal Transport,” \$6,075, E. Piner (PI), M. Holtz (co-PI)

2015-2018, Army HBCU/MI, “Integrated GaN HEMT on Diamond: Heterointerface and Thermal Transport Fundamentals,” \$594,000, E. Piner (PI), M. Holtz (senior collaborator)

2014-2016, DARPA – GaTech/Univ.Bristol/Stanford/UCLA, “Thermal Transport in Diamond Films for Electronics,” \$300,000 – Year 1 + Year 2, M. Holtz (PI), E. Piner (co-PI)

2012-2014, DARPA / ONR / Texas A&M University, “Selective III-N Epitaxy Development,” \$197,971 (subcontract), E. Piner (PI)

2012-2013, Texas Instruments – Dallas, “GaN-on-Si(111) Epitaxy Investigation for 600V Demonstration,” \$120,000 (two performance-based contracts, \$60k each – 1st award, April, 2012), E. Piner (PI)

2012, Texas A&M University TEES Grant for equipment acquisition of a Wafer Bonding System, \$55,000, (with additional contributions of \$80,000 University, \$25,000 College, and \$5,000 Physics Departmental funds to match), E. Piner (PI)

2011-2012, SEMATECH, “Unrestricted Grant – Research & Development Activities Related to GaN for Power Devices”, \$20,000, E. Piner (PI)

2011-2012, NSF – Major Research Instrumentation, “Acquisition of ICP-RIE Capability at Texas State University-San Marcos,” \$545,673, In-Hyounk Song (PI), and E.L. Piner, Hsing-Huang Tseng, Maggie Chen, and Byoung You (co-PIs)

2010-2011, Nitronex Corp / MDA-AFRL, “Novel HEMT Based on GaN on Diamond for High Power Amplifiers”, PI, \$170,000 (subcontract), E. Piner (PI)

D. Fellowships, Awards, Honors:

- 2025 The Texas State Dissertation Completion Fellowship Award – Mr. Ganesh Aryal, PhD-MSEC.

- 2022 The Graduate College's Doctoral Research Support Fellowship Award – Mr. Anupam K.C., PhD-MSEC.
- 2019 The Graduate College's Doctoral Research Support Fellowship Award – Mr. Rony Saha, PhD-MSEC.
- 2017-18 The Graduate College's Doctoral Research Support Fellowship Award – Mr. Raju Ahmed, PhD-MSEC.
- 2017 The Graduate College's Doctoral Research Support Fellowship Award – Mr. Anwar Siddique, PhD-MSEC.
- 2015 The Graduate College's Doctoral Research Support Fellowship Award – Mr. Jeffrey Simpson, PhD-MSEC.
- 2014 The Graduate College's Outstanding Master's Thesis Award in Math, Physical Sciences and Engineering – Mr. Jonathan Anderson, MS-Physics.
- 2014 Presidential Distinction Award for Excellence in Scholarly / Creative Activities, Texas State University, College of Science and Engineering, Physics.
- Best Paper Award, "New Technologies for Improving the High Frequency Performance of AlGaIn/GaN High Electron Mobility Transistors," J.W. Chung, E.L. Piner, J.C. Roberts, and T. Palacios, International Conf. on Advances in Electronics and Microelectronics, 2008, ENICS '08, Sept 28 – Oct 4, 2008, Valencia, Spain, EU.
- Alpha Sigma Mu, Honorary Engineering Fraternity
- Government Assistance in Areas of National Need – Electronic Materials Fellow (1993 – 1997)

IV. SERVICE

A. Institutional

1. University:
 - Budget Model Redesign Task Force (2024 – present)
 - Faculty Grievance Hearing Officer (2024)
 - IP Committee (2010 – present)
 - University Leadership Assembly, COSE Representative (2015 – 2022)
 - Big Ideas Initiative Director / Committee (2019 – 2023)
 - University Curriculum Committee (2017 – 2022)
 - CIEDAR (Connected Infrastructure, Education, Demonstration, and Applied Research) Working Group Member (2019 – 2025)
 - STEM Workforce Advisory Council, through *Generación STEM* grant, Physics Representative (2022 – present)
 - Graduate Council, Physics Representative (2019 – 2022)
 - Special Assistant to the President, Research Center Development (2017 – 2019)
 - Texas State Moonlight Breakfast (2010, Fall)
2. College:
 - Microfabrication Lab Strategy Committee (2010 – 2011)
 - COSE – Curriculum Committee, MSEC (2013 – 2022)
 - Advanced Functional Materials-RSC Steering Committee – Chair (2014 – 2019)
 - College Research Enhancement Committee (CREC) – Physics Faculty Representative (2014-2015 & 2016-2017)
 - College of Education Tenure & Promotion Review Group (2014 – 2015)
 - College of Science & Engineering Tenure & Promotion Review Group (2015 – present)
 - Chemistry/Biochemistry Chair Search Committee – Chair (2023 – 2024)

3. Department/School:

Physics Faculty Search Committee (2010)
MSEC-ETF Faculty Search Committee (2011 – 2012)
MSEC-Physics University Chair Faculty Search Committee (2012)
MSEC Committee of Committees (2011 – present)
MSEC PhD Admission Committee (2012 – 2019)
Physics Personnel Committee (2013 – present), Chair (2016 – 2022)
Physics Faculty Search Committee – Chair (2013 – 2014)
Physics Faculty Search Committee – Chair (2014 – 2015)
MSEC Engineering & Science Building Classroom Task Force (2016 – 2018)
Physics Faculty Search Committee (2016 – 2017)
Physics Faculty Search Committee (2017 – 2018)
Physics Graduate Advisor (2017 – 2022)
Physics Faculty Search Committee (Astronomy) (2018 – 2019)
MSEC Faculty Search Committee (EE) (2020 – 2021)
Physics Faculty Search Committee (Materials Physics) (2022 – 2023)
Physics Department Chair (2022 – present)

B. Professional:

- *Fellow*, National Academy of Inventors. 12/2024 – present.
- *Senior Member*, The Institute of Electrical and Electronics Engineers (IEEE)
- *Member*, Materials Research Society (MRS), and Electrochemical Society (ECS)
- WOCS-DICE – Workshop on Compound Semiconductor Devices and Integrated Circuits – Europe. *Member – International Advisory Committee*, 2012 – present.
- EMC – Electronic Materials Conference, USA. *Member – Technical Advisory Committee*, 2012-present.
- *Member*, Central Texas Regional Center of Innovation & Commercialization (RCIC) Advisory Board. (Advisory Board members support the review process of the Texas Emerging Technology Fund by providing expertise, industry sector perspective and support to the Central Texas RCIC Board.) 2014 – present.
- Transactions on Electronic Devices, Associate Editor. 2019 – present.
- ESSDERC – European Solid State Device Conference. *Technical Program Committee* 2014 – 2019.
- Scientific Journal Reviewer:
 - IEEE Electron Device Letters
 - IEEE Electronics Letters
 - IEEE Transactions on Electron Devices
 - Physica E
 - Solid State Electronics
- NSF Electronic & Photonic Materials CAREER Panel, October 2018
- NSF Electronic & Photonic Materials Panel Review Team, January 2017
- NSF Electronics, Photonics & Magnetic Devices Panel Review Team, April 2015
- NSF Electronic & Photonic Materials Panel Review Team, February 2012
- NSF Electronic & Photonic Materials Panel Review Team, January 2011
- State of Texas Expert Review, end of year testing STEM questions review – Lone Star Assessment & Publishing, and Pearson Publishing, Austin, TX, December 2010
- North Carolina State University, Materials Science and Engineering Department, 2008-2009 Senior Design Project; Presentation and Final Paper Panel Judge, April 24, 2009.

C. Community:

- 2016-2017 – New Braunfels High School Independent Study and Mentorship Program, Mr. Jake Ables, Topic: Superconductivity.
- 2016, February – San Marcos Area Chamber of Commerce, Education Advisory Board Meeting. Invited to discuss US Army Education Outreach Program for High School STEM Research Apprenticeship Program.
- 2016, February – San Marcos High School. As follow-up to CoC Education Advisory Board Meeting, invited to discuss US Army Education Outreach Program for High School STEM Research Apprenticeship Program to two teachers and their classes.
- Texas Nitride Network – Founding Member (organization consisting of Texas A&M, Texas Tech, SEMATECH-Austin, and UT-Dallas for coordinating research and funding pursuits)

D. Service Honors and Awards:

- Alpha Sigma Mu, Honorary Engineering Fraternity
- Engineers Council, NCSU Student Government (1993)

Updated 9/2025