Noah P. Allen

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EDUCATION

Doctor of Philosophy in Electrical Engineering – *Doctoral Bradley Fellow*   *Expected Graduation May 2019*
Virginia Tech, Blacksburg, Virginia
    Research Topic: Understanding the effect of carbon contamination in GaN drift layers for power devices

Master of Science in Electrical Engineering   *December 2014*
Virginia Tech, Blacksburg, Virginia
    Thesis Title: "Electrical Characterization of Ruthenium Dioxide Schottky Contacts on GaN"

Bachelor of Science in Electrical Engineering   *May 2009*
Georgia Institute of Technology, Atlanta, Georgia

RESEARCH INTERESTS

Understanding non-idealities in semiconductor device operation through electrical and optical characterization methods with a focus on power semiconductor materials and devices

RESEARCH EXPERIENCE

Graduate Researcher, Graduate Program at Virginia Tech   *January 2010 to Present*
Virginia Tech, Blacksburg, Virginia
Research Mentor: Louis Guido, PhD
- Project: Understanding the effects and origin of deep-level traps in GaN power devices introduced during MOCVD growth
- Fabricate Schottky and PN diodes in a cleanroom environment capable of large breakdown voltages and low on-resistances
- Utilize optical and electrical characterization methods (DLTS, SSPC, IV, CV etc.) to explain deviations from ideal operation

Summer Intern, Electronic Systems Sector at Northrop Grumman   *May 2010 to August 2010*
Northrop Grumman Advanced Technology Labs, Baltimore, MD
Internship Mentors: Monica Lilly and Joe Payne, PhD
- Created high resolution Raith E-Beam lithography process to minimize CNTFET channel
- Produced a DUV process for higher resolution photolithography and assisted colleagues with SEM imaging

Undergraduate Researcher, NNIN REU Program at Cornell NanoScale Facility   *May 2008 to August 2008*
Cornell University, Ithaca, NY
Research Mentor: Mr. Donald Tennant
- Project: "Using Near-field Holography to Investigate Super Hydrophobic Surfaces"
- Created high resolution resist process for near-field holography system in the attempt to study its application for super hydrophobic surfaces

Undergraduate Researcher, Georgia Tech Research Institute Nanotechnology Lab   *August 2007 to May 2009*
Georgia Institute of Technology, Atlanta, Georgia
Research Mentor: W. Jud Ready, PhD
- Project: "Correlation of Design Parameters in Carbon Nanotube-Based Supercapacitors"
- Developed, processed, and fabricated carbon nanotube electrodes for electro-chemical double layer supercapacitors

PUBLISHED WORK

- ***[In Progress]*** Allen, Noah, et al. "*Variation of Interface Inhomogeneity in Ru/GaN Schottky Diodes Annealed at Different Temperatures*"
- ***[In Progress]*** Allen, Noah, et al. "*Impact of increasing Ammonia on deep level defects in GaN grown by metal organic chemical vapor deposition*"
- ***[Submitted]*** Allen, Noah, et al. "*Characterization of Inhomogeneous Ni/GaN Schottky Diode with a Modified Log-Normal Distribution of Barrier Heights*" *Solid State Electronics*

- Jingshan Wang, Chris Youtsey, Robert McCarthy, Rekha Reddy, **Noah Allen**, Louis Guido, Jinqiao Xie, Edward Beam, and Patrick Fay, *"Thin-film GaN Schottky diodes formed by epitaxial lift-off"* *Applied Physics Letters* 110.17 (2017): 173503.
- Kevin T. Chern, **Noah P. Allen**, Timothy A. Ciarkowski, Oleg. A. Laboutin, Roger E. Welser, and Louis J. Guido, "*GaInN/GaN solar cells made without p-type material using oxidized Ni/Au Schottky electrodes.*" *Materials Science in Semiconductor Processing* 55 (2016): 2-6.
- P. D. Nguyen, M. Clavel, P. S. Goley, J. S. Liu, **N. Allen**, L. J. Guido, and M. K. Hudait, "*Heteroepitaxial Ge MOS Devices on Si Using Composite AlAs/GaAs Buffer.*" *IEEE Journal of the Electron Devices Society* 3.4 (2015): 341-348.
- A. Hajjiah, A. Alkhabbaz, **N. Allen**, L. Guido. "*Parameter extraction of oxidized Ni/Au and Ni-only transparent conducting oxides on n-type GaN Schottky barrier diode with bias dependent barrier height and ideality factor at different temperatures,*" European PV Solar Energy Conference (EU PVSEC 2017), Amsterdam, The Netherlands, September 25-27, 2017.

- Jingshan Wang, Chris Youtsey, Robert McCarthy, Rekha Reddy, **Noah Allen**, Louis Guido, Andy Xie, Edward Beam, Patrick Fay "*Thin-film GaN p-n Diodes and Epitaxial Lift-Off From GaN Substrates*," Compound Semiconductor Week 2017, Session B8: Surfaces and Processing, Berlin, Germany, May 14-18, 2017.
- Louis J. Guido, Timothy A. Ciarkowski, Eric P. Carlson, and **Noah P. Allen**, "*Behavior of arsenic in GaN at densities ranging from isovalent doping to dilute ternary alloys*," International Workshop on Nitride Semiconductors (IWN 2016), Session F0.3 (Paper F0.3.05), Orlando, Florida, October 2-7, 2016.
- Louis J. Guido, Eric P. Carlson, Timothy A. Ciarkowski, and **Noah P. Allen**, "*Electronic properties of n-type and p-type GaN with isovalent arsenic co-doping*," 6th International Symposium on Growth of III-Nitrides (ISGN-6), Session Tu-A (Paper A12), Hamamatsu, Japan, November, 2015.
- Kevin T. Chern, Louis J. Guido, Timothy A. Ciarkowski, **Noah P. Allen**, Oleg A. Laboutin, Roger E. Welser, and Victor C. Elarde, "*GaInN/GaN-Ni/Au transparent conducting oxide Schottky barrier solar cells*." *Photovoltaic Specialist Conference (PVSC), 2014 IEEE 40th*. IEEE, 2014.
- R. M. Umbel, T. A. Ciarkowski, K. T. Chern, **N. P. Allen**, and L. J. Guido, "*Electronic properties of n-type and p-type GaN with isovalent arsenic co-doping*," 10th International Conference on Nitride Semiconductors, Washington, DC, August, 2013.
- **Noah Allen**, Preston Pinto, Aziz Traore, Masoud Agah. "*Paper-based capacitive mass sensor*." *Sensors, 2011 IEEE*

TEACHING & MENTORING EXPERIENCE

Instructor, Electrical Engineering Department at Virginia Tech — *Summer I 2016*
Course Titles: (ECE 2004) Electric Circuit Analysis

Instructor, Electrical Engineering Department at Virginia Tech — *Summer II 2015*
Course Titles: (ECE 2204) Electronics

Instructor, Engineering Education Department at Virginia Tech — *Summer II | 2011 | 2012 | 2014*
Course Title: (ENGE 1104) Exploration of Digital Future — *Summer I | 2013 | 2014*
Spring | 2013

Teaching Assistant, Electrical Engineering Department at Virginia Tech — *Summer I 2012*
Course Titles: (ECE 3544) Digital Design I

Teaching Assistant, Electrical Engineering Department at Virginia Tech — *Summer I 2012*
Course Titles: (ECE 2504) Intro. To Computer Engineering

Teaching Assistant, Electrical Engineering Department at Virginia Tech — *Spring 2011*
Appointment: Electronics/Circuit Support Group — *Fall 2012*

Teaching Assistant, Engineering Education Department at Virginia Tech — *Fall 2012*
Course Title: (ENGE 1024) Engineering Exploration

Teaching Assistant, Engineering Education Department at Virginia Tech — *Spring 2011*
Course Title: (ENGE 1104) Exploration of Digital Future

Graduate Mentor, Electrical Engineering Department at Virginia Tech — *Fall 2012*
Project: Measurement and Analysis of IV/CV Data from Schottky Diodes — *Spring 2012*

Student Worker, Engineering Education Department at Virginia Tech — *Summer I 2011*
Project: LabVIEW myDAQ Workshop Creator — *Summer II 2011*

AWARDS & ACTIVITIES

- Bradley Department of ECE Bradley Fellowship Award, 2015 - 2018
- Engineering Education Teach Talks Scholarship, Spring 2013
- Electrical Engineering Department Fellowship Award, Spring 2011
- ETA KAPPA NU (HKN) Electrical and Computer Engineering Honor Society, February 2010
- Student Member, IEEE, January 2007 - Present
- Presidential Undergraduate Research Award, UROP, August 2008
- PURA Travel Award, UROP, March 2008/February 2009
- Poster Presentation at Annual TMS Conference, March 2008/February 2009
- Intel Diversity Summit 2008, Intel Foundation, August 2008
- Intel 2008 REU Fellow, Intel Foundation, May 2008

SKILLS

- 10+ Years' Class 100/1000 Cleanroom Fabrication and Analysis Experience
  - *Georgia Tech MRC | Cornell NanoScale Facility | Virginia Tech MicrON Cleanroom*
  - *Acid/Base/Solvent Processing | Photolithography | RIE Etching | PECVD Deposition | Thermal/E-Beam Evaporation*
  - *SEM | AFM | Optical Profilometer | Ellipsometer | Optical Microscope*
- 10+ Years' Electronic/Optical Lab Equipment Setup and Measurement Experience
  - *SMU | Autoprober | Vacuum Probe Station | Oscilloscope | Impedance Analyzer | LabVIEW DAQ | Capacitance Meter*
- 7+ Years' Programming and Modeling Experience
  - *Crosslight TCAD | L-Edit | Silvaco SSuprem3 | C/C++ | LabVIEW | MATLAB | VHDL | Assembly | Autodesk Inventor*