Curriculum Vitae

Daniel Mauch PhD

Lubbock, TX
(281) 782-3760
danielmauch@outlook.com
US Citizen

Research Interests

Pulsed Power Systems and Components, SiC Photoconductive Switching, Power Semiconductor Devices, Semiconductor Manufacturing, Pulsed RF sources.

Education

Ph.D. in Electrical Engineering

Texas Tech University • 6/2013 – 8/2017

Dissertation: *Photocurrent Efficiency and Limitation in 4H-SiC Photoconductive Semiconductor Switches*

M.S. in Electrical Engineering

Texas Tech University • 6/2012 – 5/2013

Thesis: *Silicon Carbide Photoconductive Semiconductor Switches and Optical Trigger Sources*

B.S. in Electrical Engineering

Texas Tech University • 8/2008 – 5/2012

Industry Experience

SK Siltron CSS

North America Sales Manager · 08/2022 - Present

- Responsible for all aspects of customer relationships for North American based accounts.
- Negotiate commercial, technical and legal terms of long-term supply contracts. Closed deals with key customers accounts worth > $120M.
- Developed a statistical model to estimate manufacturing capacity and capability for customer-specific products. This was used to improve demand planning and led to updates in corporate KPIs.
- Manage and direct team composed of applications engineer, inside sales representative, and customer service representative.

Applications Engineer · 04/2021 - 08/2022

- Owned the technical service and support for 8 key North American based customer accounts.
- Led root cause analysis investigations and collaboratively developed Design-of-Experiments (DOEs) with customers to resolve Supplier Corrective Action Requests (SCARs).
- Created and implemented business processes and systems for reviewing, approving and managing customer product specifications. These processes and automation eliminated 24 work hours per specification, resulting in a total savings of >4,000 work hours to date.
- Statistically modeled manufacturing trends to determine which parametric quality improvements would provide the best return in terms of total yield improvement.

X- FAB · Lubbock, Texas

Product Development Engineer · 03/2016 - 03/2021

- Led the development of two key global customer product lines through the full development cycle (onboarding, tape-out, development and optimization, reliability testing, and high-volume release).
- Managed the Power America funded projects running at X-FAB for North Carolina State University, Sonrisa Research, and SUNY Polytechnic at various project stages.

- Developed a novel method for fill and planarization in the manufacturing of SiC devices; patent US-12176107-B2. Directly contributed to patent figures and claims.
- Designed and tested multiple internal SiC devices (power MOSFETs and diodes) for internal process development and innovation. Developed internal automation tools for device design utilizing Cadence Virtuoso and SKILL code scripting.
- Prepared and taught the power semiconductor physical layout design section of the Texas Tech University / X-FAB education partnership funded by Power America.

Research Experience

Sandia National Laboratories · Albuquerque, New Mexico, United States

Graduate Student Researcher · 06/2015 - 06/2017

- Successfully developed and validated a system for measuring $<$ 1ns reverse recovery times in high voltage GaN/AlGaN diodes in less than 3 months.
- Contributed to experimental work on the observation of atmospheric breakdown, THz generation, and THz measurement.

Texas Tech University · Lubbock, Texas

Graduate Student Researcher · 01/2012 - 05/2017

- Expanded the knowledge base of bulk-lateral SiC Photoconductive Semiconductor Switches (PCSSs) over previously unexplored parameter spaces. Developed and validated a root cause model explaining the limited device lifetime of bulk-lateral SiC PCSSs.
- Designed, fabricated and characterized a PIN SiC PCSS over unexplored parameter spaces. The developed PIN SiC PCSS demonstrated a 6x improvement in photocurrent efficiency and a $>10^3$x improvement in device lifetime.
- Developed an optical system for generating a high-frequency (~65MHz) pulse train of high-power UV laser pulses from a single input pulse. System was integrated with a SiC PCSS and a microwave source to produce an all-solid state high-power microwave system.
- Management and mentoring of master's and undergraduate students.

Awards

- Texas Tech University Doctoral Dissertation Completion Fellowship (2016-2017)
- IEEE International Power Modulator and High Voltage Conference student travel grant award (2014)
- National Merit / El-Paso Corp. Scholarship (2008-2012)
- Texas Tech University Honors Endowed Merit Scholarship (2008-2013)

Teaching & Mentoring Experience

- (SK Siltron CSS) Direct people management experience. Responsible for the supervision and development of applications engineer, inside sales representative, and customer service representative.
- (X-FAB) Prepared and taught the power semiconductor physical layout design section of the Texas Tech University / X-FAB education partnership funded by Power America.
- (Texas Tech University) Indirect mentoring and supervision of master's level student research assistants.
- (Texas Tech University) Tutoring and outside of class instruction for undergraduate ECE students in the fundamentals of electrical engineering course (previously circuits – ECE 3302)

Peer Reviewed Publications

[1] Mauch, Daniel L., Fred J. Zutavern, Jarod J. Delhotal, Michael P. King, Jason C. Neely, Isik C. Kizilyalli, and Robert J. Kaplar. "Ultrafast reverse recovery time measurement for wide-bandgap diodes." IEEE Transactions on Power Electronics 32, no. 12 (2017): 9333-9341.

[2] Mauch, Daniel, William Sullivan, Alan Bullick, Andreas Neuber, and James Dickens. "High power lateral silicon carbide photoconductive semiconductor switches and investigation of degradation mechanisms." IEEE Transactions on Plasma Science 43, no. 6 (2015): 2021-2031.

[3] Mauch, Daniel, Cameron Hettler, William W. Sullivan, Andreas A. Neuber, and James Dickens. "Evaluation of a pulsed ultraviolet light-emitting diode for triggering photoconductive semiconductor switches." IEEE Transactions on Plasma Science 43, no. 7 (2015): 2182-2186.

[4] Meyers, Vincent, Daniel Mauch, James Dickens, and Andreas Neuber. "Nonlinear UV absorption properties of bulk 4H-SiC." Journal of Applied Physics 121, no. 11 (2017): 115703.

[5] Bragg, J-WB, William W. Sullivan III, Daniel Mauch, Andreas A. Neuber, and J. C. Dickens. "All solid-state high power microwave source with high repetition frequency." Review of Scientific Instruments 84, no. 5 (2013): 054703.

[6] Meyers, V., A. R. Chowdhury, D. Mauch, J. C. Dickens, A. A. Neuber, and R. P. Joshi. "Analysis of intensity dependent near-bandedge absorption in semi-insulating 4H–SiC for photoconductive switch applications." Journal of Physics D: Applied Physics 50, no. 13 (2017): 135104.

[7] Wilson, Nicholas, Daniel Mauch, Vincent Meyers, Shannon Feathers, James Dickens, and Andreas Neuber. "Pulsed characterization of a UV LED for pulsed power applications on a silicon carbide photoconductive semiconductor switch." Review of Scientific Instruments 88, no. 8 (2017): 085109.

[8] Sullivan III, W. W., D. Mauch, A. Bullick, C. Hettler, A. Neuber, and J. Dickens. "A compact 45 kV curve tracer with picoampere current measurement capability." Review of Scientific Instruments 84, no. 3 (2013): 034702.

[9] Esser, Benedikt, Daniel Mauch, James Dickens, John Mankowski, and Andreas Neuber. "Tunable, electrically small, inductively coupled antenna for transportable ionospheric heating." Radio Science 53, no. 4 (2018): 496-508.

[10] Sullivan III, W. W., D. Mauch, A. Bullick, C. Hettler, A. Neuber, and J. Dickens. "A compact 45 kV curve tracer with picoampere current measurement capability." Review of Scientific Instruments 84, no. 3 (2013): 034702.

[11] Chowdhury, Animesh R, Daniel Mauch, Ravi P. Joshi, Andreas A. Neuber, and James Dickens. "Contact extensions over a high-k dielectric layer for surface field mitigation in high power 4H–SiC photoconductive switches." IEEE Transactions on Electron Devices 63, no. 8 (2016): 3171-3176.

[12] Tiskumara, R., R. P. Joshi, D. Mauch, J. C. Dickens, and A. A. Neuber. "Analysis of high field effects on the steady- state current-voltage response of semi-insulating 4H-SiC for photoconductive switch applications." Journal of Applied Physics 118, no. 9 (2015): 095701.

[13] Ekinci, H., Kuryatkov, V. V., Mauch, D. L., Dickens, J. C., & Nikishin, S. A. (2015). Plasma etching of n-type 4H-SiC for photoconductive semiconductor switch applications. Journal of Electronic Materials, 44(5), 1300-1305.

[14] Ekinci, H., Kuryatkov, V. V., Mauch, D. L., Dickens, J. C., & Nikishin, S. A. (2014). Effect of BCl3 in chlorine-based plasma on etching 4H-SiC for photoconductive semiconductor switch applications. Journal of Vacuum Science & Technology B, 32(5).

Conference Presentations

[1] Mauch, Daniel L., Vincent E. Meyers, Ravi P. Joshi, Andreas A. Neuber, and James C. Dickens. "Limitations of bulk SiC photoconductive semiconductor switches, and evaluation of PIN SiC photoconductive semiconductor switches." In 2016 IEEE International Conference on Plasma Science (ICOPS), pp. 1-1. IEEE, 2016.

[2] Mauch, D., J. Dickens, V. Kuryatkov, V. Meyers, R. Ness, S. Nikishin, and A. Neuber. "Evaluation of GaN: Fe as a high voltage photoconductive semiconductor switch for pulsed power applications." In 2015 IEEE Pulsed Power Conference (PPC), pp. 1-4. IEEE, 2015.

[3] (Invited) Mauch, Daniel, Chris White, David Thomas, Andreas Neuber, and James Dickens. "Overview of high voltage 4H- SiC photoconductive semiconductor switch efforts at Texas Tech University." In 2014 IEEE International Power Modulator and High Voltage Conference (IPMHVC), pp. 23-26. IEEE, 2014.

[4] Mauch, D., Sullivan, W., Bullick, A., Neuber, A., & Dickens, J. (2013, June). Performance and characterization of a 20 kV, contact face illuminated, silicon carbide photoconductive semiconductor switch for pulsed power applications. In 2013 19th IEEE Pulsed Power Conference (PPC) (pp. 1-3). IEEE.

[5] Mauch, Daniel, Cameron Hettler, W. W. Sullivan, and J. Dickens. "Fiber optic system for high frequency burst operation of a silicon carbide photoconductive semiconductor switch." In 2012 IEEE International Power Modulator and High Voltage Conference (IPMHVC), pp. 351-353. IEEE, 2012.

[6] Meyers, V., Mauch, D., Kuryatkov, V., Nikishin, S., Dickens, J., Neuber, A., & Ness, R. (2017, June). Toward the development of an efficient bulk semi-insulating GaN photoconductive switch. In 2017 IEEE 21st International Conference on Pulsed Power (PPC) (pp. 1-4). IEEE.

[7] Thomas, D., Mauch, D., White, C., Neuber, A., & Dickens, J. (2014, June). Characterization of mid-bandgap defect states in 4H-SiC for optimization of SiC photoconductive semiconductor switches. In 2014 IEEE International Power Modulator and High Voltage Conference (IPMHVC) (pp. 530-532). IEEE.

[8] Reale, D. V., Mauch, D., Johnson, J. M., Neuber, A. A., Dickens, J. C., & Mankowski, J. J. (2014, June). Radiation from SiC PCSS driven gyromagnetic nonlinear transmission line high power microwave source. In 2014 IEEE International Power Modulator and High Voltage Conference (IPMHVC) (pp. 123-125). IEEE.