TY R. MCNUTT

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OBJECTIVE

- To obtain a rewarding career in the semiconductor development industry

EDUCATION

2001 to present **University of Arkansas** **Fayetteville, Arkansas**

- *PhD Candidate*
- 4.0 *GPA*
- *Expected date of graduation – May 2004*

1998 to 2001 **University of Arkansas** **Fayetteville, Arkansas**

- *Master of Science in Electrical Engineering*
- 3.7 *GPA*

1994 to 1998 **Hendrix College** **Conway, Arkansas**

- *Bachelor of Arts in Physics (Liberal Arts Institution)*
- *Minor in Mathematics*
- 3.3 *GPA*

EXPERIENCE

May 1999 to present **University of Arkansas** **Fayetteville, Arkansas**
Dept. of Electrical Engineering
Advisor: Alan Mantooth, Ph.D., P.E.
MANTOOTH@ENGR.UARK.EDU

GRADUATE ASSISTANT - PHD

Performed characterization and modeling of state-of-the-art Silicon Carbide (SiC) PiN, Schottky, and Merged-PiN-Schottky (MPS) power rectifiers, and vertical Doubled-implanted MOSFET (DiMOSFET) devices. Developed and validated physics-based, compact models for circuit simulation of the SiC power devices. The models were validated for on-state, transient, and temperature characteristics. The SiC power diode model is expected to be the first commercially available SiC model available in a circuit simulator.

GRADUATE ASSISTANT - MSEE

Performed electrothermal finite element analysis of Silicon-on-Insulator (SOI) CMOS compatible thermal-based data isolators, or transducers for Jet Propulsion Laboratory (JPL). Developed over ten novel thermal transducers for low power, low speed data isolation in Systems-On-a-Chip (SoC). Designed thermal transducers and signal recovery circuitry for state-of-the-art 0.18 μm Fully-Depleted (FD) SOI, 0.35 μm Partially-Depleted (PD) SOI, and 0.8 μm PDSOI fabrication runs. Wrote two winning proposals, one to the National Science Foundation to start the SiC modeling group at the UA and the other to Arkansas Space Grant Consortium to acquire travel funds to JPL.

May 2000 to present | **National Institute of Standards and Technology (NIST) Semiconductor Electronics Division** | **Gaithersburg, Maryland**

GUEST RESEARCHER

May 2002 - August 2002 – Characterized and modeled high power SiC power MOSFET devices for on-state, transient, and temperature dependencies. Developed automated parameter extraction program for compact SiC power MOSFET model. Part of a team that developed a new high-speed, high-power reverse recovery test system for a new class of high-power SiC power rectifiers. Part of a team that developed a novel 12 kV pulsed-breakdown tester for safely testing new high-power SiC devices for breakdown characteristics without destroying the devices.

May 2001 - August 2001 – Characterized and modeled new commercially available 600-V, SiC Schottky power diodes. Developed parameter extraction sequence for SiC power diode model for on-state, transient, and temperature characteristics for Schottky, MPS, and PiN SiC diode technologies. Validated the sequence for the each of the diode technologies.

May 2000 - November 2000 – Characterized and modeled high and low current SiC PiN and Merged PiN Schottky (MPS) power diodes. Developed compact model for circuit simulation of power diodes. Validated model for on-state, transient, and temperature characteristics.

Spring 2002 | **University of Arkansas Dept. of Electrical Engineering** | **Fayetteville, Arkansas**

ELECTRONICS II INSTRUCTOR

Served as an instructor for a junior-level Electronics II course for one semester. Performed every facet including lecturing, producing homework assignments and exams, grading, and holding office hours.

June 1998 to August 2001 | **Cargill, Inc.** **Engineering Services Dept.** | **Springdale, Arkansas**

MANAGEMENT TRAINEE

June 1998 - August 1998 – Selected to participate in Cargill's program to train promising college students for industrial management. Aided in the management of over ten departments for approximately one week apiece. Managerial duties included managing the quality control lab and personnel in each department. Gained experience in meeting product deadlines, and preventing and working around equipment downtime.

INTERN ELECTRICAL ENGINEER

August 1998 - August 2001 – Formed employee-training program for hourly and salaried employees, and developed job definitions and skill requirements for all technical service positions. Analyzed plant airflow and temperature to reduce condensation and reported various ways to prevent cross contamination. Wrote commitments for multiple large budget projects. Researched plant energy consumption and conservation for all of the Division's plants and reported to main office. Aided in the scheduling and management of the Engineering Services Department. Setup programs for construction contractor guidelines, developed Lockout/Tagout safety specifications for plant equipment, and developed hands-on employee testing for promotional system pertaining to electrical, hydraulic, and pneumatic systems.

1997 to 1998 | **Hendrix College** **Physics Department** | **Conway, Arkansas**

RESEARCH ASSISTANT

Constructed and analyzed 15-meter ring laser to monitor seismic waves. Presented findings at National Conference on Undergraduate Research and APS - AAPT joint meetings.
Constructed Gaussian surface, Tungsten plume probe, and noise reduction equipment to detect metal ions in rocket plumes and analyzed results.

PUBLICATIONS & PRESENTATIONS

T. McNutt, R. Dunn, *Monitoring Seismic Waves with a Ring Laser*, 1998 American Physical Society/American Association of Physics Teachers (APS/AAPT) Joint Meeting, Columbus, Ohio, April, 1998.

T. McNutt, R. Dunn, *Monitoring Seismic Waves with a Ring Laser*, National Conference on Undergraduate Research (NCUR), Salisbury State University, Salisbury, Maryland, April 1998.

G. Russell, **T. McNutt**, C. Rogers, R. Dunn, *Data Measurement and Analysis for a Large Ring Laser*, National Conference on Undergraduate Research (NCUR), Salisbury State University, Salisbury, Maryland, April 1998.

A. Mantooth, **T. McNutt**, M. Mojarradi, H. Li, B. Blalock, "Electrically Isolating Thermally Coupled Device for Noise Suppression of Circuits in Deep Space," *Forum on Innovative Approaches to Outer Planetary Exploration 2001-2020*, Lunar and Planetary Institute, Houston, Texas, February 2001.

T. McNutt, T. Klari, S. Bui, A. Mantooth, "An SOI compatible thermal transducer for low-power systems-on-a-chip data isolation," *Technical Summit Conference*, University of Arkansas, Fayetteville, Arkansas, April 2001.

T. McNutt, A. Mantooth, *Design of an Electrically Isolating Thermally Coupled Device for Noise Suppression of Circuits in Deep Space*, Arkansas Space Grant Symposium, Harding University, Searcy, Arkansas, April 2001.

A. Mantooth, **T. McNutt**, *Modeling of an Electrically Isolating Thermally Coupled Device for Noise Suppression of Circuits in Deep Space*, Arkansas Space Grant Symposium, Harding University, Searcy, Arkansas, April 2001.

T. McNutt, A. Hefner, A. Mantooth, J. Duliere, D. Berning, R. Singh, " Silicon-Carbide PiN, Schottky, and Merged PiN-Schottky Power Diode Models Implemented in the Saber Circuit Simulator," *Conf. Rec. of IEEE Power Electronics Specialists Conf (PESC)*, pp. 2103-2108, Vancouver, Canada, June 2001.

T. McNutt, A. Lostetter, A. Mantooth, M. Mojarradi, "A Novel SOI CMOS Compatible Thermal Device Technology," *Proceedings of THERMES 2002, Conference on Thermal Challenges in Next Generation Thermal Systems*, Santa Fe, NM, January 2002.

T. McNutt, A. Mantooth, K. Olejniczak, "Silicon Carbide Schottky, Merged PiN Schottky, and PiN Power Diode Models for Circuit Simulation," *Technical Summit Conference*, University of Arkansas, Fayetteville, Arkansas, April 2002.

T. McNutt, A. Hefner, A. Mantooth, J. Duliere, D. Berning, R. Singh, "Parameter Extraction Sequence for SiC Schottky, Merged PiN Schottky, and PiN Power Diode Models," *Conf. Rec. of IEEE Power Electronics Specialists Conf (PESC)*, pp. 1269-1276, Cairns, Australia, June 2002.

T. McNutt, A. Hefner, A. Mantooth, J. Duliere, D. Berning, R. Singh, " Silicon-Carbide PiN, Schottky, and Merged PiN-Schottky Power Diode Models Implemented in the Saber Circuit Simulator," Accepted to the *IEEE Transactions on Power Electronics*, 2003.

T. McNutt, A. Hefner, A. Mantooth, D. Berning, S.H. Ryu, "Silicon Carbide Power MOSFET Model and Parameter Extraction Sequence," To be published in the *Conf. Rec. of 2003 IEEE Power Electronics Specialists Conf (PESC)*.

K. Speer, **T. McNutt**, A. Lostetter, A. Mantooth, D. Berning, A. Hefner, K. Olejniczak, "A Novel High Frequency Silicon Carbide, SIT-Based Test-Bed for the Acquisition of SiC Power Device Reverse Recovery Characteristics," To be published in the *Proceedings of the 2003 European Conference on Power Electronics and Applications*.

M. Hoque, D. Moorman, **T. McNutt**, J. Zhang, T. Ahmad, T. Cao, A. Mantooth, M. Mojarradi, "High Voltage Dickson Charge Pump in an SOI Process," to be submitted to the *IEEE Journal of Solid-State Circuits*, March 2003.

Invited papers:

A. Hefner, D. Berning, **T. McNutt**, A. Mantooth, J. Lai, R. Singh, J. Palmour, " Characterization and Modeling of Silicon Carbide Power Devices," *Proceedings of the International Semiconductor Device Research Symposium (ISDRS) 2001*, pp. 568-571, Washington, D.C., December 2001.

AWARDS & EXTRACURRICULAR ACTIVITIES

- Hendrix College Physics Departmental Distinction 1998 – One of only four graduates with departmental distinction in physics.
- U of A Tech Summit Conference 2001 – Paper submission voted one of the top five papers at the conference.
- U of A Tech Summit Conference 2002 – Paper submission selected as second place in Prize Paper Competition.
- Member IEEE Power Electronics Society – *IEEE Transactions on Power Electronics* Reviewer

- Member IEEE Electron Devices Society
- Member Institute of Electrical and Electronics Engineers (IEEE) U of A Chapter
- Member Eta Kappa Nu (HKN) Electrical and Computer Engineering Honor Society
- Member IEEE Components, Packaging, and Manufacturing Technology (CPMT) U of A Chapter
- Member International Microelectronics and Packaging Society (IMAPS) U of A Chapter
- Member Society of Physics Students Hendrix College Chapter
- Volunteer Mentor Boys and Girls Club, Paris, AR

RELATIVE COURSE WORK & COMPUTER SKILLS

· *Undergraduate Courses*
Fundamental Physics I, II, & III, Modern Physics, Intermediate Mechanics, Intermediate Electricity and Magnetism, Quantum Mechanics I & II, Chemistry I & II, Synthesis of Physical Theories, Electronics I & II, Signal Processing, Systems and Signal Analysis, Electromechanical Energy Conversion, Microprocessor System Design

· *Graduate Courses*
Power Electronics, Solid-State Electronics, Switch-Mode Power Conversion, IC Fabrication Technology, IC Fabrication Technology Laboratory, Power Distribution and Transmission, Advanced Electronic Packaging

· *Computers*
PCs, Macs, Sun Workstations

· *Operating Systems*
Unix, Windows 95/98/NT/2000Pro/XP, DOS

· *Programming*
MAST Hardware Description Language, C, Assembly Language

· *Application*s
Medici (2D Finite Element Software), Taurus Process & Device (3D FES), VWF Interactive Tools, Atlas (2D FES), Mentor - IC Station, PC1D, SPICE, Saber, Matlab, Mathematica, Igor, Labview, Labwindows/CVI, Frontpage, AutoCAD, MS Word, Excel, Amipro, Lotus 123

INTERESTS

- Characterization and modeling of semiconductor devices
- Silicon Carbide (SiC) device physics
- Silicon-on-Insulator (SOI) circuit design
- High temperature electronics

References are available upon request