Shelby Lacouture, PhD

RELEVANT WORK EXPERIENCE

10/2/2021 - Present **Center for Emerging Energy Sciences, TTU**
Title:
Senior Scientist
Accomplishments:

- Design of Respiratory Sensor Array.
- Design of electronic systems for an FT-ICR MS.

10/2/2019 - 10/1/2021 **Center for Emerging Energy Sciences, TTU**
Title:
Senior Research Associate
Accomplishments:

- Electronic systems design of smart-modules for metrology applications.

1/1/2017 - 10/1/2019 **Private Research Facility**
Title:
Senior Scientist
Accomplishments:

- Part of diverse team working in the condensed-matter nuclear field.
- Designed low-noise universal power supply with internal and external voltage and current modulation.
- Designed a differential, open system (mass, energy) calorimeter with solid-state heat reservoir.
- Designed a high voltage/current pulsed-power driver for high d**B**/dt magnetic field generation.

1/1/2017 - 6/1/2017 **Center for Pulsed Power and Power Electronics, TTU**
Title:
Senior Research Associate
Accomplishments:

- Technical lead for active Army Research Lab (ARL) cooperative working with experimental WBG power semiconductor devices.

6/1/2010 – 1/1/2017 **Center for Pulsed Power and Power Electronics, TTU**
Title:
Research Assistant
Accomplishments:
ARL Cooperative Agreement Narrow Pulse Test Bed:

- Designed main control unit for Si and SiC device evaluation system.
- Designed custom multi-channel data acquisition system.
- Designed 3P3T high – isolation electromechanical switch.
- Designed characterization system with pulsed high current and 10 kV HV capabilities.
- Designed 500 A curve tracer utilizing a pulsed-linear amplifier for power semiconductors.
- Designed wide injection range Open Circuit Voltage Decay (OCVD) system to perform Injection Dependent Lifetime Spectroscopy (IDLS) on packaged semiconductor junctions.
- Created windows – based software for user input and data storage for each system listed above.

ARL Cooperative Agreement Wide Pulse Test Bed:

- Designed digital control system to retrofit an aircraft ground power unit for use as an inertial energy storage unit.
- Designed digital firing sequencer for a three phase-controlled rectifier system.

General:

- Designed stand – alone software that calculates and graphs all output parameters of a wind energy turbine for specified physical characteristics and input parameters.
- Developed stable mathematical model for Damped Gyromagnetic Precession (DGP) and model for overall NLTL performance incorporating DGP.

8/27/2009 - 5/15/2010 **Center for Pulsed Power and Power Electronics, TTU**
Title:
Undergraduate Assistant
Accomplishments:
ARL Cooperative Agreement Wide Pulse Test Bed phase:

- Designed Embedded Control System for Rotational Machine used in wide pulse test bed.

5/27/2008 - 8/8/2008 **Micro and Nano Device Engineering Research Experience for Undergraduate Program, TTU**
Title:
Research Assistant
Accomplishments:

- Developed MEMS gripper system with scaled force – feedback.
- Designed Controller for Class on a Chip Inc.

EDUCATION

8/14/2016 – 12/16/2016 **Texas Tech University Lubbock, TX**
Degree Earned:
Doctor of Philosophy, Electrical Engineering
Cumulative GPA: 4.000
Awards/Honors:

- 2016 Arthur H. Guenther Pulsed Power Student Award

6/1/2010 – 8/13/2016 **Texas Tech University Lubbock, TX**
Degree Earned:
Master's of Science, Electrical Engineering
Cumulative GPA: 4.000
Awards/Honors:

- 2011 - 2012 Directed Energy Professional Society Scholar

8/27/2007 – 5/15/2010 **Texas Tech University Lubbock, TX**
Degree Earned:
Bachelor of Science, Electrical Engineering with minor in Mathematics
Summa Cum Laude
Cumulative GPA: 4.000
Awards/Honors:

- 2007 Fall President's List
- 2008 Spring President's List
- 2008 Fall President's List

- 2008 Edward E. Whitacre Jr. College of Engineering Award for Scholastic Achievement
- 2009 Spring President's List
- 2009 Edward E. Whitacre Jr. College of Engineering Award for Scholastic Achievement
- 2010 Spring Outstanding Senior
- 2010 Highest Ranking Graduate College of Engineering 2010

8/25/2005 - 5/11/2007 **Amarillo College Amarillo, TX**
Degree Earned:
Associate in Science, Engineering
with highest honors
Cumulative GPA: 4.000
Awards/Honors:
- 4/24/2005 Academic Excellence Award
- 4/30/2006 Academic Excellence Award
- 4/22/2007 Academic Excellence Award
- 4/22/2007 Artle J. Lynn Memorial Award in Engineering

INVENTIONS AND PATENTS

- Invented 3D static magnetic field vector imaging array, US patent US10393827B2.
- Invented Wide - injection range Open Circuit Voltage Decay system, US patent US11143694B2.
- Invented electric current imaging system, US patent US11493566B2.
- Invented Open System Differential Calorimeter, TTU Office of Commercialization has filed a Provisional patent for the system.
- Invented Open System Vacuum Differential Calorimeter, TTU Office of Commercialization is evaluating the system for a potential patent.
- Invented Sensor Integration Block, TTU Office of Commercialization is evaluating the system for a potential patent.

HONOR SOCIETIES

Phi Theta Kappa Society	Beta Eta Chapter
Eta Kappa Nu Association	Gamma Nu Chapter
Tau Beta Pi	Texas Beta Chapter
Phi Kappa Phi	Texas Tech University Chapter

PROGRAMMING LANGUAGES

ANSI C	INTEL Assembly
C++	HCS912 Assembly
PICmicro Assembly	Visual BASIC

LANGUAGES

Classical Latin

PUBLICATIONS

Total number of citations: 159

Journal articles (15):

- M. Kim et al., "Evaluation of Long-Term Reliability and Overcurrent Capabilities of 15-kV SiC MOSFETs and 20-kV SiC IGBTs During Narrow Current Pulsed Conditions," in IEEE Transactions on Plasma Science, doi: 10.1109/TPS.2020.3030295.
- Robert P. Thorn *et al.*, "A quantitative light-isotope measurement system for climate and energy applications," International Journal of Mass Spectrometry, Volume 464, 2021, 116574, ISSN 1387-3806, doi: 10.1016/j.ijms.2021.116574.
- S. Lacouture, *et al.*, "A solid-state, open-system, differential calorimeter", Review of Scientific Instruments, 91, 9,, 2020, AIP.
- S. Lacouture, *et al.*, "An open circuit voltage decay system for performing injection dependent lifetime spectroscopy", Review of Scientific Instruments, 88, 9,, 2017, AIP.
- J. A. Schrock *et al.*, "Failure Modes of 15-kV SiC SGTO Thyristors During Repetitive Extreme Pulsed Overcurrent Conditions," in *IEEE Transactions on Power Electronics*, vol. 31, no. 12, pp. 8058-8062, Dec. 2016.
- Lacouture, Shelby; Bayne, Stephen, "A 500 A device characterizer utilizing a pulsed-linear amplifier", Review of Scientific Instruments, 87, 2,, 2016, AIP.
- Lawson, K.; Bayne, S.B.; Lacouture, S.; Lin Cheng; O'Brien, H.; Ogunniyi, A.; Scozzie, C., "Safe Operating Area and Long-Term Reliability of 9-kV Silicon Carbide PNPN Super Gate Turn-Off Thyristors," in *Electron Device Letters, IEEE* , vol.35, no.8, pp.862-864, Aug. 2014.
- "An evaluation system for experimental silicon and silicon carbide super gate turn off thyristors", Bayne, Stephen and Lacouture, Shelby and Lawson, Kevin and Giesselmann, Michael and Scozzie, Charles J. and O'Brien, Heather and Ogunniyi, Aderinto A., Review of Scientific Instruments, 85, 075107 (2014).
- "Automated modular high energy evaluation system for experimental thyristor devices", Lacouture, Shelby and Lawson, Kevin and Bayne, Stephen and Giesselmann, Michael and Scozzie, Charles J. and O'Brien, Heather and Ogunniyi, Aderinto A., Review of Scientific Instruments, 84, 105108 (2013).
- Ashwin P. Vijayasai, Ganapathy Sivakumar, Matthew Mulsow, Shelby Lacouture, Alex Holness, Tim E. Dallas, Haptic controlled three degree-of-freedom microgripper system for assembly of detachable surface-micromachined MEMS, Sensors and Actuators A: Physical, Volume 179, June 2012.
- "Evaluation of High Power Experimental SiC SGTO Devices for Pulsed Power Applications," Shelby Lacouture et al., 2012, Materials Science Forum, 717-720, 1183
- "Haptic Controlled 3 – Axis MEMS Gripper System," A. Vijayasai, G. Sivakumar, M. Mulsow, S. Lacouture, A. Holness, and T. Dallas, Review of Scientific Instruments 81, 105114 (2010).
- "Mesoscale to microscale manipulation using haptic interface and MEMS microgripper," A. Vijayasai, A. Holness, S. Lacouture, and T. Dallas, SPIE MOEMS-MEMS, 2010, San Jose, CA {SPIE Vol. 7593-18}
- "Remotely accessible laboratory for MEMS testing," G. Sivakumar, M. Mulsow, A. Mellinger, S. Lacouture, and T. Dallas, SPIE MOEMS-MEMS, 2010, San Jose, CA, {SPIE Vol. 7592-19}
- "Low-cost system for testing MEMS for research and educational applications," Gabriel Ramirez, Ganapathy Sivakumar, Shelby Lacouture, and Tim Dallas, SPIE MOEMS-MEMS, 2010, San Jose, CA, {SPIE Vol. 7592-21}

Conference papers (14):

- M. Kim *et al.*, "Analysis of a New 15-kV SiC n-GTO under Pulsed Power Applications," *2019 IEEE Pulsed Power & Plasma Science (PPPS)*, Orlando, FL, USA, 2019, pp. 1-4.
- A. Ogunniyi *et al.*, "Pulsed power evaluation and simulation of high voltage 4H-SiC P-Type SGTOs," *2016 Lester Eastman Conference (LEC)*, Bethlehem, PA, 2016, pp. 55-58.
- Hirsch, EA; Schrock, JA; Lacouture, S; Bilbao, A; Bayne, S; Giesselmann, M; O'Brien, H; Ogunniyi, A, ",Evaluation of long term reliability and safe operating area of 15 kV SiC PiN diodes during ultra-high current pulsed conditions,"Power Modulator and High Voltage Conference (IPMHVC), 2016 IEEE International",,,563-567,2016,IEEE.
- Ogunniyi, A.A.; O'Brien, H.K.; Hinojosa, M.; Cheng, L.; Scozzie, C.J.; Pushpakaran, B.N.; Lacouture, S.;

Bayne, S.B., "Analysis of carrier lifetime effects on HV SIC PiN diodes at elevated pulsed switching conditions," in Pulsed Power Conference (PPC), 2015 IEEE , vol., no., pp.1-6, May 31 2015-June 4 2015.

- Lacouture, S.; Schrock, J.A.; Ray, W.B.; Hirsch, E.A.; Bayne, S.; Giesselmann, M.; O'Brien, H.; Ogunniyi, A.; Scozzie, C., "Extraction of Safe Operating Area and long term reliability of experimental Silicon Carbide Super Gate Turn Off Thyristors," in Pulsed Power Conference (PPC), 2015 IEEE , vol., no., pp.1-4, May 31 2015-June 4 2015.
- Ray, W.B.; Schrock, J.A.; Bilbao, A.V.; Kelley, M.; Lacouture, S.; Hirsch, E.; Bayne, S.B., "Analysis of GaN power MOSFET exporsure to pulsed overcurrents," in Pulsed Power Conference (PPC), 2015 IEEE , vol., no., pp.1-5, May 31 2015-June 4 2015.
- O'Brien, H.K.; Shaheen, W.; Ogunniyi, A.; Scozzie, C.; Lin Cheng; Hinojosa, M.; Lawson, K.; Lacouture, S.; Bayne, S., "Large chip area SiC PiN diodes demonstrated for thyristor protection in a pulsed system," in Power Modulator and High Voltage Conference (IPMHVC), 2014 IEEE International , vol., no., pp.538-541, 1-5 June 2014.
- Lawson, K.; Lacouture, S.; Bayne, S.; Giesselmann, M.; O'Brien, H.; Ogunniyi, A.; Scozzie, C.J., "Design of an advanced modular automated evaluation system for experimental high power Si and SiC SGTOs," in Plasma Science (ICOPS), 2013 Abstracts IEEE International Conference on , vol., no., pp.1-1, 16-21 June 2013.
- Lacouture, S.; Lawson, K.; Bayne, S.; Giesselmann, M.; O'Brien, H.; Ogunniyi, A.; Scozzie, C.J., "Design of an advanced modular automated evaluation system for experimental high power SGTOs," Pulsed Power Conference (PPC), 2013 19th IEEE , vol., no., pp.1,4, 16-21 June 2013.
- Lawson, K.; Lacouture, S.; Bayne, S.B.; Giesselmann, M.; Vollmer, T.; O'Brien, H.; Scozzie, C.; Ogunniyi, A., "Design of an automated test bed for experimental Si and SiC SGTO devices," in Power Modulator and High Voltage Conference (IPMHVC), 2012 IEEE International , vol., no., pp.347-350, 3-7 June 2012.
- “Unique high energy test bed for experimental thyristor devices,” Shelby Lacouture, Stephen B. Bayne, Michael G. Giesselmann, Kevin Lawson, H O'Brien, C. J. Scozzie, PPC 2011, June 19 - 23, 2011, Chicago, Ill.
- “Evaluation of experimental silicon sgto devices for pulsed power applications,” Shelby Lacouture, Stephen B. Bayne, Michael G. Giesselmann, Kevin Lawson, H O'Brien, C. J. Scozzie, PPC 2011, June 19 – 23, 2011, Chicago, Ill.
- “Tele-operated Microsystems Laboratory,” G. Sivakumar, M. Mulsow, A. Mellinger, S. Lacouture, and T. Dallas, Proceedings of the ASME 2009 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2009, August 30 - September 2, 2009, San Diego, California, USA.
- “Class on a Chip,” G. Ramirez, S. Lacouture, G. Sivakumar, and T. Dallas, COMS 2009, August 30 – September 4, 2009, Copenhagen, Denmark.

REFERENCES

Extensive references available