

Megan Makela

EDUCATION

Doctor of Philosophy in Materials Science and Engineering May 2022
Texas A&M University, College Station, TX

Bachelor of Science in Materials Science and Engineering May 2018
University of Florida, Gainesville, FL
Certificate: Semiconductor Materials
Cum Laude

RESEARCH EXPERIENCE

PATHS-UP Graduate Research Fellow August 2018 to Present
Texas A&M University, College Station, TX

- Conducted research contributing to NSF PATHS-UP (Precise Advanced Technologies and Health Systems for Underserved Populations) Engineering Research Center initiatives and contributed to projects as a member of the Mid-Infrared Integrated Photonics and Remote Sensing (MiPRoS) Laboratory, focusing on the development of integrated photonic circuit devices for chip-scale, label-free sensing, enabling detection of biological compounds for remote health monitoring and point-of care diagnostics
- Utilized micro- and nanoscale fabrication techniques in a ISO 5 cleanroom facility, characterized devices and materials using a variety of microscopy and spectroscopy techniques, designed and verified components with optical modeling and simulation software, assisted in the production of scientific writing for proposals and articles

Structural Materials Database Researcher June 2017 to August 2019
Sandia National Laboratories, Livermore, CA

- Developed schema for databases in Granta MI and populated those databases with relevant material and test data found through literature review, primarily for structural metals and alloys exposed to high pressure hydrogen environments
- Designed and performed experiments investigating the effects of strain gauge bonding processes - including surface preparation, curing time and temperature, and gauge pattern - on their behavior under hydrogen pressures ranging from 1 ksi up to 15 ksi

Student Researcher January 2018 to May 2018
Senior Capstone Course, University of Florida, Gainesville, FL

- Investigated the cause of failure for a high voltage insulator using mount and polish, microscopy, hardness testing, and other materials testing techniques
- Considered materials specification information and analysis of manufacturing process with collected data to draw conclusions about failure

Student Researcher August 2017 to May 2018
SWAMP Center, University of Florida, Gainesville, FL

- Performed electrical characterization, including four point probe, Hall effect, and CV measurements, in order to investigate the effect of implantation on phosphorous deactivation and clustering of highly doped Si:P epitaxially grown thin films
- Prepared samples from pieces of an unearthened 1300-year-old pre-Columbian era smelting furnace using cutting and polishing techniques; characterized furnace material composition using SEM with EDS analysis

Student Researcher January 2017 to May 2017
Lattice Undergraduate Labs, University of Florida, Gainesville, FL

- Conducted extensive literature review on undergraduate laboratory experiments detailing formation of self-assembled monolayers, instrumentation, and analysis techniques
- Compiled, reviewed and summarized sources to create a resource to be used later for the development of undergraduate laboratory activities

PROFESSIONAL EXPERIENCE

Process Engineer

September 2019 to Present

GenXComm, Inc., College Station, TX

- Wafer process integration and fabrication of core product and next-generation technologies
- Develop new fabrication processes and report findings to further advance photonic technology and intellectual property

Global-Ops Engineering Co-op

May 2018 to August 2018

Advanced Micro Devices, Austin, TX

- Assisted product development engineers in test development, silicon debug, and characterization; performed engineering and correlation studies to ensure yield and reliability
- Worked with R&D on cross functional teams to resolve design related issues, and interfaced with designers and foundry personal in support of project milestones

Engineering Intern / Office Manager

May 2016 to January 2017

SpinCore Technologies, Inc., Gainesville, FL

- Used oscilloscopes to test programmable TTL, RF, and arbitrary waveform pulse pattern generators and answered technical product questions from customers world-wide using engineering knowledge and background, gaining exposure to complex topics like nuclear magnetic resonance spectroscopy and electrical pulse generation
- Oversaw and completed daily administrative operations and financial activities including managing inventory and office supplies, completing basic bookkeeping work, and maintaining records and company database systems during which time the company saw nearly \$1 million in profits

TEACHING & MENTORING EXPERIENCE

Undergraduate Research Mentor

January 2020 to present

Texas A&M University, College Station, TX

PATHS-UP Summer REU Graduate Mentor

June 2019 to August 2019

Texas A&M University, College Station, TX

Undergraduate Teaching Assistant

January 2016 to May 2016

University of Florida, Gainesville, FL

- Assisted and supervised Cross-Disciplinary Laboratory students during experiments and activities covering a wide variety of topics across physics, chemistry, and biology disciplines
- Contributed to the development of materials and methods to better facilitate student learning

Youth After School Program Leader

January 2015 to April 2015

Porters Community Center, Gainesville, FL

- Led sessions of the “Girls to Young Ladies” after-school program for at-risk girls ranging from 3rd to 8th grade, focusing on behavior management and STEM related learning activities
- Created and modified activities, demonstrations, and activities to be developmentally and academically appropriate for individual participants, while acknowledging strengths and positive behavior

Mentor & Teaching Assistant

July 2012 to August 2014

Okaloosa STEMM Academy, Niceville, FL

- Worked with middle school students on individual research projects, emphasizing learning of the scientific research process, writing, and presentation skills
- Aided in instruction through discussions, demonstrations, and activities in science for gifted and advanced middle school students, working with students one-on-one and in group settings

LEADERSHIP & SERVICE EXPERIENCE

Student Chapter President

May 2019 to Present

Materials Research Society, Texas A&M University, College Station, TX

Alumna Advisory Council Member

May 2018 to Present

Pi Beta Phi Fraternity for Women, Texas A&M University, College Station, TX

- Volunteered as a member of the Alumna Advisory Council for the Texas Eta chapter of Pi Beta Phi Fraternity for Women, working with other council members and collegiate counterparts to guide decisions related to regular chapter activities, needs, and problems
- Served as a mentor to collegiate women, acting as a role model and practicing servant leadership in congruence with organizational values in order to empower members to strive for personal growth

Youth & Amateur Adult Soccer Referee

July 2010 to Present

United States Soccer Federation, United States

- Officiated games and tournaments in accordance with published rules and procedures to ensure standards of play for the purpose of fair play and safety; attended training courses to maintain knowledge of annually updated rules
- Addressed game circumstances quickly by analyzing actions and events, evaluating possible results, and making and effectively communicating decisions to best protect all involved parties; acted with professionalism in handling conflicts and resolving high pressure situations

Science and Engineering Fair Judge

March 2019 to Present

Various Locations, TX

- Judged science and engineering fair projects as a subject matter expert in the category of materials science for middle and high school participants at various regional level and state competitions
- Provided constructive feedback and encouragement to students to guide further interest in research and the scientific process; acted as a role model for participants by sharing previous personal experience

Policy and Standards Board Member

November 2016 to May 2018

Pi Beta Phi Fraternity for Women, University of Florida, Gainesville, FL

- Met confidentially with chapter members on matters related to chapter standards, including conduct, financial responsibility and scholarship; helped members gain a greater understanding of bylaws, constitution, and policy statements
- Served as a member of the annual Bylaw Review committee; communicated suggestions for changes and improvements with executive board and alumnae advisory board members

Engineering Senator

February 2016 to February 2017

Student Government Senate, University of Florida, Gainesville, FL

- Represented the Herbert Wertheim College of Engineering and Benton Engineering Council (BEC) in a 100-member student senate and authored legislation in support of BEC member organizations
- Developed, directed, evaluated, and revised student services and programs under a \$20 million total budget, working closely with the executive and judicial branches of student government, as well as with faculty, administration, and state representatives
- Served as a member of the Rules and Ethics Committee; reviewed absence excuses and made recommendations for Senate action on excuses, enforced constituency requirements and developed programs to encourage completion of requirements

Hospital Volunteer

January 2015 to May 2015

UF Health Shands Hospital, Gainesville, FL

- Volunteered weekly with the UF Health Neurology, completed student hospital volunteer training in accordance with hospital policy and HIPAA regulations
- Maintained patient medical charts and filed medical record forms; restocked supplies, cleaned and prepared spaces and equipment to internal standards

Administrative Assistant

June 2012 to May 2018

True Joy Counseling & Consulting, Destin, FL

- Maintained working knowledge of general office administrative and clerical procedures to assist office administrative staff in distributing incoming and outgoing mail, maintain files and offices forms
- Completed data entry, input patient and chart information quickly and accurately from a variety of sources into a computer database, sorted and prepared documents for scanning/imaging

PUBLICATIONS

M. Makela, P. Gordon, D. Tu, C. Soliman, G. L. Coté, K. Maitland, and P. T. Lin, "**Benzene Derivatives Analysis Using Aluminum Nitride Waveguide Raman Sensors**," *Analytical Chemistry*, May 2020.

M. Makela, P. T. Lin, "**On-Chip Detection of SARS-CoV-2 DNA Targets Using Optofluidic Nano-Slot Waveguides**," *Sensors*, submitted.

M. Makela, D. Tu, G. L. Coté, K. Maitland, P. T. Lin, "**Low Concentration Detection of SERS-Enhanced Raman Using Aluminum Nitride Optical Waveguides**," in preparation.

POSTERS & PRESENTATIONS

Makela, M. (March 2020). "*Micro-Ring Resonator Arrays for On-Chip Raman Spectrum Analysis*", PATHS-UP Annual Advisory Board Meeting & NSF-ERC Site Visit, College Station, TX.

Makela, M., (August 2019). "*Chip-Scale Raman Biosensor Using Plasmonics Integrated Photonic Circuits*", PATHS-UP External Advisory Board Meeting & Industry Site Visit, College Station, TX.

Makela, M., Soliman, C. (March 2019). "*Optical Waveguides for On-Chip Fluorescence and Raman Measurements*", PATHS-UP Annual Advisory Board Meeting & NSF-ERC Site Visit, College Station, TX.

HONORS & AWARDS

Honors Program (2014 - 2018)
National Merit Scholarship Finalist (2014)
Florida Academic Scholars Award (2014 - 2018)
Dean's List (2014 - 2018)

F.N. Rhines and W.R. Tarr Scholarship (2017)
Vladimir Grodsky Memorial Scholarship (2016)
Phi Kappa Phi, Honor Society (2018)
Tau Beta Pi, Engineering Honor Society (2019)

AFFILIATIONS

Materials Research Society
SPIE
Society of Women Engineers

Tau Beta Pi
Phi Kappa Phi
Pi Beta Phi Fraternity for Women

SKILLS

Micro- & Nano-fabrication

Photolithography
E-beam Lithography
Focused Ion Beam
E-beam PVD
Sputter PVD
Plasma-enhanced CVD
Low Pressure CVD
Reactive Ion Etching
Wet Etching

Characterization

Profilometer
Spectroscopic Ellipsometer
Device Parameter Analyzer
Optical Microscope
SEM w/ EDS
Raman Confocal Microscope
UV-Vis-NIR Spectrophotometer
FTIR Spectrometer
Differential Scanning Calorimeter

Software

AutoCAD
SolidWorks
JMP
OriginPro
Granta MI
Lumerical FDTD
ImageJ
MATLAB
Python