

Cary A. Kuliasha, Ph.D.

2438 NW 52nd Avenue, Gainesville, FL, 32605

P: (865) 604-6068 • E: ckuliash@gmail.com

EXECUTIVE SUMMARY

High energy Materials Science and Engineering Ph.D. scientist with extensive technical skills over a broad area of expertise including biomaterials, polymer chemistry and physics, implantable neural devices, cleanroom microfabrication, and materials characterization. Over twelve years of work experience across both US government and academic institutions where I have developed a versatile, participative leadership style focused on building high performing teams to deliver results against stretch goals. Engaged diverse, multifunctional team members and leveraged their experience and skills to secure multiple competitive research grants and achieve target milestones. Have successfully published research product in eleven peer reviewed publications, submitted three patents, and presented technical material to target audiences at home and abroad. Gained extensive leadership, mentoring, and laboratory safety experience with a focus on community outreach and STEM education.

EDUCATION

University of Florida (UF)

Gainesville, FL

Ph.D. Materials Science and Engineering, August 2016

- Thesis: Surface Engineering and Chemical Patterning of Silicone Rubber to Control Bioadhesion
- Advisor: Prof. Anthony A. Brennan
- Specialization: Polymer Chemistry, Surface Characterization, and Biomaterials

M.S. Materials Science and Engineering, May 2014

University of Tennessee

Knoxville, TN

B.S. Materials Science and Engineering, May 2012

- Specialization: Biomaterials; Minor: History

RESEARCH & WORK EXPERIENCE

Post-Doctoral Researcher, UF, Electrical & Computer Engineering (February 2017-current), PI: Jack Judy

Developed improved bioelectronic neural interfaces to restore motor function for amputees and warfighters. Primary research focused on miniaturizing thin-film microelectrode arrays, improving long-term device reliability, and improving back-end packaging technology to enable chronic *in vivo* electrophysiological signal processing and neural communication. Research sponsored by the Defense Advanced Research Projects Agency (DARPA) and the National Institutes of Health (NIH).

- Attained role as lead post-doctoral researcher of a cross-disciplinary, multi-investigator team composed of engineering professionals, students, and health-care staff from various fields.
 - Successfully completed all milestones for phase I-II Defense Advanced Research Projects Agency (DARPA) award (\$3,525 M) and provided substantial technical contributions to recently awarded NIH NINDS R01 grant (\$2,400 M)
- Conceptual design, microfabrication, and packaging of neural devices for sensory and motor communication
 - Tissue-Engineered Electronic Neural Interface (TEENI)
 - Electronic Longitudinal Intramedullary Bioreactor (eLIMB)– Collaboration with University of Wisconsin
 - Longitudinal Intrafascicular Electrodes (LIFE)– Collaboration with U.S. Veterans Affairs
- Delivered improved materials and microfabrication strategies that increased neural device reliability
 - Developed FDA approved aggressive *reactive*-accelerated aging test (e.g., heated saline with H₂O₂ to mimic chronic inflammation) to challenge devices *in vitro* and accelerate development towards *in vivo* success
 - Devices have successfully recorded electrophysiological signals from animal models for chronic time periods
- Created high performance culture as the Laboratory safety manager responsible for conducting risk assessments, root-cause-analysis, and safety trainings while ensuring EH&S Compliance. No reported safety accidents, injuries, or non-compliance issues during tenure.

Post-Doctoral Researcher, UF, Materials Science & Engineering (August 2016-January 2017), PI: Laurie Gower

Studied biomineralization and crystallization of calcium oxalate renal stones to understand the role of Randal's plaques in nephrolithiasis. Research sponsored by the National Science Foundation (NSF) and NIH.

- Successfully developed a microfluidic testbed to identify the impact of biologically relevant crystallization modifiers and proteins on calcium oxalate and calcium phosphate growth on synthetic basement membrane

Graduate Research Assistant, UF, Materials Science & Engineering (2012-2016), PI: Anthony Brennan

Engineered micro/nano-structured polymeric coatings to determine their resistance to biofouling by marine organisms and mammalian cells. Research sponsored by the US Office of Naval Research (ONR).

- Successfully identified non-toxic surface chemistries that inhibited fouling by *U. linza* zoospores by 99%, increased fouling release of *N. incerta* diatoms by 97%, and inhibited bacterial colonization of *C. lytica*, compared to controls
 - Developed amphiphilic copolymer grafted silicone rubber surfaces with targeted molecular weight and surface morphology

Cary A. Kuliasha, Ph.D.

2438 NW 52nd Avenue, Gainesville, FL, 32605

P: (865) 604-6068 • E: ckuliash@gmail.com

- Developed a UV initiated reversible addition-fragmentation chain-transfer (RAFT) polymerization strategy to synthesize coatings with engineered anti-biofouling chemistries and chemical patterns with tunable molecular weight, feature size, and geometry
- Developed course material and taught 4-credit hour Senior-level Polymer Physics course with laboratory component with one TA under my supervision (Fall 2015)
- Served as Laboratory safety manager. Partner in Academic Laboratory Safety with Exxon Mobil to synthesize industry safety standards and overcome institutional roadblocks within an academic environment

Technical Researcher, Oak Ridge National Laboratory, Mechanical Properties and Mechanics Group (2008-2012),
PI: Edgar Lara-Curzio

Studied the effect of mechanical deformation on thermoelectric materials and synthesized novel thermoelectric composites. Research sponsored by the Center for Revolutionary Materials for Solid State Energy Conversion and the US Department of Energy (DOE)

- Designed and implemented mechanical creep testing apparatus with *in situ* analysis of electrical resistivity of doped bismuth telluride (BiTe) thermoelectric materials. Conducted post-test fracture analysis, oxide layer formation, and grain growth analysis
- Produced and characterized BiTe/carbon nanofiber thermoelectric composites. Conducted mechanical tensile/compression testing and Seebeck coefficient analysis of composite thermoelectric materials

PUBLICATIONS

1. Rudy, A.; **Kuliasha, C.**; Uruena, J.; Rex, J.; Schulze, K.; Stewart, D.; Angelini, T.; Sawyer, W.; Perry, S. *Lubricious Hydrogel Surface Coatings on Polydimethyl siloxane (PDMS)*. *Tribology Letters* **2017**, *65* (3), DOI: 10.1007/s11249-016-0783-7
2. **Kuliasha, C.**; Finlay, J.; Franco, S.; Clare, A.; Stafslie, S.; Brennan, A. *Marine Antifouling Efficacy of Amphiphilic Poly(coacrylate) Grafted PDMS: Effect of Graft Molecular Weight*, *Biofouling* **2017**, *33*, (3), p 252-267, DOI: 10.1080/08927014.2017.1288807
3. **Kuliasha, C.**; Fedderwitz, R.; Calvo, P.; Sumerlin, B.; Brennan, A. *Engineering the Surface Properties of Poly(dimethylsiloxane) Utilizing Aqueous RAFT Photografting of Acrylate/Methacrylate Monomers*, *Macromolecules* **2018**, *51* (2), p 306-317, DOI: 10.1021/acs.macromol.7b02575
4. **Kuliasha, C.** and Judy, J. *in vitro Reactive-Accelerated-Aging (RAA) Assessment of Tissue-Engineered-Electronic-Nerve-Interfaces (TEENI)*, **2018** 40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), DOI: 10.1109/EMBC.2018.8513458
5. Beygi, M.; Bentley, J.T.; Frewin, C.L.; **Kuliasha, C.**; Takshi, A.; Bernardin, E.; La Via, F.; Sadow, S.E. *Fabrication of a Monolithic Implantable Neural Interface from Cubic Silicon Carbide*, *Micromachines* **2019**, *10* (7), DOI: 10.3390/mi10070430
6. **Kuliasha, C.** and Judy, J. *In Vitro Reactive-Accelerated-Aging Assessment of Anisotropic Conductive Adhesive and Back-End Packaging for Electronic Neural Interfaces*, **2019** 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)
7. **Kuliasha, C.**, Spearman, B., Atkinson, E., Rustogi, P., Furniturewalla, A., Nunamaker, E., Otto, K., Schmidt, C., Judy, J. *Sensing Nerve Activity with Scalable and Robust Nerve Interfaces*, *IEEE Sensors* **2019**
8. **Kuliasha, C.**; Fedderwitz, R.; Finlay, J.; Franco, S.; Clare, T.; Brennan, A. *Engineered Chemical Nanotopographies: Reversible Addition-Fragmentation Chain-Transfer Mediated Grafting of Anisotropic Poly(acrylamide) Patterns on Poly(dimethylsiloxane) to Modulate Marine Biofouling*, *Langmuir* **2020**, *36* (1), p 379-387, DOI: 10.1021/acs.langmuir.9b03117.
9. **Kuliasha, C.**; Rodriguez, D.; Lovett, A.; Gower, L. *In situ flow cell platform for examining calcium oxalate and calcium phosphate crystallization on films of basement membrane extract in the presence of urinary 'inhibitors.'* *CrystEngComm* **2020**, *22*, p 1448-1458, DOI: 10.1039/C9CE01587F
10. **Kuliasha C.**; Mobini, S.; Siders, Z.; Bohmann, N.; Judy, J.; Schmidt, C.; Brennan, A. *Microtopographical Patterns Promote Different Responses in Fibroblasts and Schwann Cells: A Possible Feature for Neural Implants*, *J. Biomed. Mat. Res. A*. **2020**, DOI: 10.1002/jbm.a.37007
11. Spearman, B.; **Kuliasha, C.**; Judy, J.; Schmidt, C. *Integration of Flexible Polyimide Arrays into Soft Extracellular Matrix-based Hydrogel Materials for a Tissue-Engineered Electronic Nerve Interface (TEENI)*, *J. Neural Engineering Methods* **2020**, *341* (15), DOI: 10.1016/j.jneumeth.2020.108762
12. **Kuliasha C.** and Judy, J. *Reliable Fabrication Strategies for Polyimide-Based Neuroelectronic Devices: A Materials Science Perspective*, In Preparation, *J. Neural Engineering*
13. **Kuliasha, C.**; Fedderwitz, R.; Stafslie, J.; Finlay, J.; Clare, A.; Brennan, A. *Anti-Biofouling Properties of Poly(dimethylsiloxane) with RAFT Photopolymerized Acrylate/Methacrylate Surface Grafts Against Model Marine Organisms*, In Preparation, *Biofouling*

Cary A. Kuliasha, Ph.D.

2438 NW 52nd Avenue, Gainesville, FL, 32605

P: (865) 604-6068 • E: ckuliash@gmail.com

MENTORSHIP

University Multicultural Mentorship Program (UMMP), University of Florida (2018-present)

- Mentor first-year undergraduate students (1-2 students/year) who are typically members of an under-represented minority group. Encourage students to participate and engage in academic, social, and cultural activities and help them to navigate their first year on campus.
- Meet with students at least once a month for the duration of the academic year to build a trusting and beneficial relationship. Specific mentoring areas are dependent on student's needs and interests.

Undergraduate Research Experience

- "Automatic *Reactive*-Accelerated Aging Platform Development," Andrew Plummer (2018-2019)
- "Surface Free Energy Analysis of Chemically Patterned Coatings," Rebecca Fedderwitz (2016-2017)
 - Currently attending the University of Maryland Ph.D. program
- "Protein Binding Studies to Polymeric Substrates," Janna Royal (2014-2015)
- "UV Photografting of Poly(dimethyl siloxane)," Wade Ingram (2013-2014)
 - Currently attending North Carolina State University Ph.D. program

STEM & COMMUNITY OUTREACH

Student Reporting Labs: PBS News Hour, <https://studentreportinglabs.org/>, STEM Advisor/Mentor, Oak Leaf High School, Florida (2019)

- Provide technical STEM advice and mentorship to High School student youth reporters/ journalists and help students complete capstone projects. Project funded by the NSF and the Public Broadcasting Service (PBS)

Letters to a Pre-Scientist, <https://www.prescientist.org/> (2018-present)

- Scientist 'pen-pal' with young students primarily from low-income families or members of under-represented groups. The objectives of the program are to demystify STEM and build a friendship with students while inspiring them to pursue STEM careers.

Skype a Scientist, <https://www.skypeascientist.com/>, (2017-present)

- Skype presentations and discussions to K-12 schools around the nation to give students the opportunity to talk with a "real" scientist. Provide students with a host of targeted information including specific research projects, STEM careers, undergraduate/ graduate school and life advice.
 - 2017- Black Mountain Elementary, KY: 6th and 7th grade
 - 2017- Northview Middle, IA: 8th grade
 - 2017- Benicia High School, CA: 7th grade
 - 2018- Bettendorf Middle School, IA: 7th grade
 - 2018- Monacan High School, VA: 11th-12th grade
 - 2018- Duxbury Public Schools, MA: 11th-12th grade
 - 2018- Sandburg High School, IL: 11th grade
 - 2019- Grossmont High School, CA: 10th-12th grade
 - 2019- Rosemont Middle School, CA: 8th grade
 - 2019- Neuqua Valley High School, IL: 9th grade

Science Fair Judge, Alachua County High Schools, Florida (2017-present)

- Serve as a judge at local and regional science fairs (6th-12th grades)

UF Engineers' Week, University of Florida (2012-2016)

- Organized and hosted an educational "Biomaterials" booth with hands on activities and material to teach Elementary and Middle school students about Materials and Biomaterials Engineering. Work was part of involvement with the UF Society for Biomaterials Student Chapter.

LEADERSHIP EXPERIENCE

Representative: College of Engineering (COE) Graduate Student Council, University of Florida (2015-2016)

- Examined graduate student life and formulated changes to COE policy to improve student welfare and representation
- Supported COE programs, policies, and graduate student recruitment

Co-Founder: Department Student Council, University of Florida (2015-2016)

- Co-founded and chaired the MSE student council and promoted student/faculty dialogue
- Implemented improvements to MSE department policy and student development. Assisted with faculty search committees.

Student Officer: Society for Biomaterials, University of Florida (2013-2016)

- President (2015-2016): Directed society activities, recruitment, and outreach. Coordinated two industry tours for members (Kimberly Clark & RTI Surgical) and increased Society membership by 14% from previous year
- Vice-President (2014-2015): Chaired organizing committee of Biomaterials Day conference with a \$12,500 budget and over 200 attendees. Awarded *Best Professional Event* by the UF Benton Engineering Council
- Treasurer (2013-2014): Managed and distributed finances, sponsorships, and fundraising totaling \$11,500.

Cary A. Kuliasha, Ph.D.

2438 NW 52nd Avenue, Gainesville, FL, 32605

P: (865) 604-6068 • E: ckuliash@gmail.com

TEACHING

Instructor, University of Florida (Fall 2015)

- Senior level Polymer Physics with laboratory component. Paid position with one TA under my supervision

Teaching Assistant, University of Florida (Fall 2015)

AWARDS

- **Jonathan Hack Memorial Scholarship for Materials Science** (\$3,000)- University of Florida (2016)
 - Awarded in recognition of outstanding service and commitment to the Department of Materials Science & Engineering
- **Travel Awards**: \$700 Society for Biomaterials Annual Meeting (2015, 2016), \$350 UF Graduate Student Council Travel Grant (2016).

PATENTS

1. **Kuliasha, C.** and Brennan, A. *Novel Antifouling Technology by RAFT Polymerization*, UF#16122, UF Office of Technology Licensing, Patent Submission, 2016
2. **Kuliasha, C.**; Brennan, A.; Mobini, S.; Schmidt, C.; Judy, J. *Sharklet Topographies to Control Neural Cell Interactions with Implanted Electrodes*, UF Office of Technology Licensing, Patent Submission, 2018, PCT/IB2018/050886
3. Judy, J.; Schmidt, C.; Otto, K.; Rinaldi, C.; **Kuliasha, C.** *Tissue-Engineered Electronic Nerve Interface*, UF#16825, UF Office of Technology Licensing, Patent Submission, 2018

ACADEMIC PRESENTATIONS

1. **Kuliasha, C.**; Villada, L.; Royal, J.; Brennan, A. *Copolymer Surface Grafting to Poly(dimethyl siloxane) Elastomer Surfaces for Controlling Bioadhesion*, Poster, Adhesion Society Annual Meeting **2013**, Savannah, GA.
2. **Kuliasha, C.**; Finlay, J.; Franco, S.; Clare, T.; Stafslie, S.; Brennan. *Random Acrylate Copolymer Surface Grafting to Poly(dimethyl siloxane) Elastomer Surfaces for Improved Anti-Biofouling*, Poster, Society for Biomaterials Annual Meeting **2015**, Charlotte, NC.
3. **Kuliasha, C.**; Fedderwitz, R.; Brennan, A. *Engineered Nanotopographies: A RAFT mediated polymerization for grafted anisotropic, nanopatterns on PDMS*, Talk, University of Florida Biomaterials Day **2016**, Gainesville, FL.
4. **Kuliasha, C.**; Argenbright, C.; Bachler, P.; Brennan, A. *Engineered Nanotopographies for Improved Biofouling Response: A RAFT Mediated Process*, Talk, World Biomaterials Congress **2016**, Montreal, CAN.
5. **Kuliasha, C.**; Fedderwitz, R.; Finlay, J.; Franco, S.; Clare, T.; Brennan, A. *Surface Engineering and Chemical Patterning to Control Biofouling*, Invited Talk, University of Florida Society for Biomaterials **2016**, Gainesville, FL.
6. **Kuliasha, C.** *Biomaterials Engineering in Academia*, Invited Talk, Florida Engineering Society **2016**, Gainesville, FL.
7. **Kuliasha, C.**; Lovett, A.; Gower, L. *Crystal Growth on Kidney Tissue and Artificial Basement Membrane*, Invited Talk, Research on Calculus Kinetics (ROCK) Society Annual Meeting **2017**, Madison, WA.
8. **Kuliasha, C.**; Natt, S.; Judy, J. *Anisotropic conductive adhesives to bond flex circuits to boards with high-density pad arrays*, Invited Talk, Interdisciplinary Microsystems Group **2017**, Gainesville, FL
9. **Kuliasha, C.**; Natt, S.; Shafor, C.; Rustogi, P.; Desai, V.; Mobini, S.; Graham, J.; Spearman, B.; Atkinson, E.; Nunamaker, E.; Wachs, R.; Schmidt, C.; Otto, K.; Brennan, A.; Judy, J. *Design and Fabrication of a Scalable Tissue-Engineered Electronic Nerve Interface (TEENI)*, Poster, DARPA HAPTIX Annual PI Meeting **2017**, Arlington, VA.
10. **Kuliasha, C.**; Rustogi, P.; Furniturewalla, A.; Judy, J. *in vitro Reactive-Accelerated-Aging (RAA) Assessment of Tissue-Engineered-Electronic-Nerve-Interfaces (TEENI)*, Poster, Neuroelectronic Interfaces: Gordon Research Conference **2018**, Galveston, TX.
11. **Kuliasha, C.**; Spearman, B.; Atkinson, E.; Rustogi, P.; Furniturewalla, A.; Nunamaker, E.; Schmidt, C.; Otto, K.; Judy, J. *Tissue-Engineered Electronic Neural Interfaces (TEENI): Fabrication, in vitro assessment, and in vivo performance*, Invited Talk, Interdisciplinary Microsystems Group **2018**, Gainesville, FL.
12. **Kuliasha, C.**; Judy, J. *in vitro Reactive-Accelerated-Aging (RAA) Assessment of Tissue-Engineered-Electronic-Nerve-Interfaces (TEENI)*, Talk, IEEE/EMBS Annual Meeting **2018**, Honolulu, HI.
13. **Kuliasha, C.**; Judy, J. *in vitro Reactive-Accelerated Aging Assessment of Anisotropic Conductive Adhesive and Implantable Packaging for Bioelectronic Neural Interfaces*, Poster, Neural Engineering IEEE/EMBS Annual Meeting **2019**, San Francisco, CA.

Cary A. Kuliasha, Ph.D.

2438 NW 52nd Avenue, Gainesville, FL, 32605

P: (865) 604-6068 • E: ckuliash@gmail.com

14. **Kuliasha, C.;** Judy, J. *In Vitro Reactive-Accelerated-Aging Assessment of Anisotropic Conductive Adhesive and Back-End Packaging for Electronic Neural Interfaces*, Talk, IEEE/EMBS Annual Meeting **2019**, Berlin, Germany.
15. **Kuliasha, C.** *Peripheral Nerve Interfaces: Design, Fabrication, and Reliability*, Invited Talk, University of Freiburg **2019**, Freiburg, Germany.
16. **Kuliasha, C.;** Furniturewalla, A.; Spearman, B.; Kasper, M.; Singh, I.; Atkinson, E.; Schmidt, C.; Rinaldi, C.; Otto, K.; Judy, J. *Tissue-Engineered Electronic Nerve Interface (TEENI): Improved Design, Fabrication, and Packing Using Aggressive in vitro Reliability Testing*, Poster, Society for Neuroscience Annual Meeting **2019**, Chicago, IL.

LABORATORY SAFETY

Laboratory Safety Manager, University of Florida (2012-present)

- Conduct laboratory safety training, risk assessment, root cause analysis, and EH&S compliance
- Organize and manage hazardous waste storage and removal

Partner in Academic Lab Safety, Exxon-Mobile (2015)

- Collaborated with Exxon-Mobile and University of Florida EH&S to evaluate and improve academic safety environment and culture

TECHNICAL SKILLS

- | | | |
|--|---|--|
| <ul style="list-style-type: none">• Microfabrication<ul style="list-style-type: none">○ Photolithography○ Dry/ Wet Etching○ Physical Vapor Deposition<ul style="list-style-type: none">▪ Sputtering▪ E-Beam Evaporation○ Chemical Vapor Deposition<ul style="list-style-type: none">▪ PECVD, Silanization○ Mask Design and Fabrication○ Laser Writing• Polymer Synthesis<ul style="list-style-type: none">○ Chain-growth, UV initiated, & RAFT• Polymer Surface Modification<ul style="list-style-type: none">○ Grafting, Plasma Oxidation, Silane Coupling | <ul style="list-style-type: none">○ Photolithographic Chemical Patterning• Material Characterization<ul style="list-style-type: none">○ Infrared and Raman Spectroscopy○ Gel Permeation Chromatography○ Differential Scanning Calorimetry○ Thermal Gravimetric Analysis○ Nuclear Magnetic Resonance○ X-ray Photoelectron Spectroscopy○ Scanning Electron Microscopy○ Surface Free Energy/ Contact Angle Goniometry○ Atomic Force Microscopy | <ul style="list-style-type: none">• Mechanical Characterization<ul style="list-style-type: none">○ Tensile, Compression, Creep○ Dynamic Mechanical Analysis○ T -peel Adhesion Testing• Electrical/ Electrochemical Characterization<ul style="list-style-type: none">○ Electrical Resistivity/ Conductivity○ Seebeck Coefficient○ Electrochemical Impedance Spectroscopy○ Cyclic Voltammetry• Labview & Matlab Programming• Solidworks CAD• MS Office Suite• Univariate Statistical Analyses |
|--|---|--|