

EDUCATION

- The George Washington University** Washington, DC
Doctor of Philosophy in Biomedical Engineering May 2020
- University of Oklahoma** Norman, OK
Master of Science in Bioengineering July 2012
- Virginia Polytechnic Institute & State University** Blacksburg, VA
Bachelor of Science in Materials Science and Engineering July 2010
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RESEARCH/TEACHING EXPERIENCE

- The George Washington University** Washington, DC
Graduate Research Assistant (Efimov Laboratory) May 2015 – Present
- Comparing the differential electrophysiological effects of β 1- vs β 2- adrenergic and cholinergic stimulation on pacemaking function in the isolated canine sinus node using optical mapping techniques and MATLAB analyses
 - Incorporating novel light-regulated optogenetic actuators to control cardiac myocyte electrical activity in three distinct models: *in vitro* human iPSC-derived cardiomyocytes, *ex vivo* donor human hearts, and *in situ* failing and non-failing rat hearts, with the purpose of providing new tools for stable optical pacing of the heart and high-throughput screens of drug safety and efficacy testing
 - Developing organotypic techniques for maintaining *ex vivo* cultures of human cardiac atrial and ventricular tissues and electrophysiologically evaluating the effects of chronic sympathetic stimulation
 - Applying optical clearing methods and fluorescent labeling to construct 3D representations of regional pacemaker architecture in mouse, rabbit, and human hearts
- The George Washington University** Washington, DC
Graduate Research Assistant (Zhang Laboratory) September 2014 – May 2015
- Applied 3D printing techniques to fabricated aligned microchannels of biocompatible polymers to promote vascular cell growth for the development of a tissue engineered vascular graft
 - Analyzed cell adhesion and mechanical properties of an electrospun shape memory polymer (SMP) as an innovative material for engineered vascular tissue grafts
 - Built custom-made flow perfusion bioreactors for tissue engineered bone constructs and small-diameter vascular grafts to improve mechanical integrity and cell functionality of implantable biomaterials
- University of Oklahoma** Norman, OK
Graduate Research Assistant (Nollert Laboratory) August 2010 – July 2012
- Developed a small diameter vascular graft as an innovative alternative tissue substitute for cardiac bypass surgeries using the human amniotic membrane
 - Created and optimized a custom-made bioreactor to increase strength of vascular graft and decrease the required time for *in vitro* graft development
 - Analyzed vascular cell adhesion and proliferation on novel substrate with quantitative and qualitative biological assays and immunohistochemistry imaging
- University of Oklahoma** Norman, OK
Graduate Teaching Assistant Fall 2010 and Spring 2011
- Supervised 30 undergraduate students (per semester) in two chemical engineering laboratory courses focused on the application of material and energy balancing principles to real world problems: momentum heat, and mass transfer; thermodynamics; kinetics; and chemical engineering design
 - Facilitated equipment support, monitored student safety, and regulated chemical waste disposal

Virginia Tech*Undergraduate Researcher (Davalos Laboratory)*

Blacksburg, VA

August 2008 – December 2009

- Fabricated PDMS microfluidic chambers to develop customizable cellulose nanofibril networks
- Performed tensile tests on 3D cellulose networks and characterized their mechanical properties

AWARDS AND FELLOWSHIPS

2017 R&D Showcase Runner-Up Poster Award

Awarded \$1000 award toward conference travel for experimental poster entitled, "Differential electrophysiological effects of β 1- vs β 2- adrenergic stimulation in the isolated canine right atrium" (Mentored by Professor Igor Efimov)

Stipend Fellowship: Louis P. Wagman Endowment Fellowship

Biomedical Engineering Department, George Washington University, 2016-2017

Tuition Fellowship: Gail E. Boggs Graduate Engineering Endowment Scholarship

Biomedical Engineering Department, George Washington University, 2015-2016

Tuition Fellowship: Graduate Engineering Honors Fellowship

Biomedical Engineering Department, George Washington University, 2014-2015

IIE Whitaker International Fellowship Recipient,*Cardiovascular Cellular Engineering Lab Fellow*

Ecole Polytechnique, Palaiseau, France

September 2012 – September 2013

- Investigated the role of hemodynamic shear forces on regulating endothelial cell migration using high resolution time-lapse video microscopy and parallel plate flow chambers
- Designed a co-culture system for parallel plate flow chambers to study how cell-cell interactions contribute to mechanisms which lead to atherosclerosis or abnormal vessel repair, as well as in promoting vascular therapeutics and tissue engineering efforts of implantable devices
- Evaluated cell speed, lag time, directionality, and displacement under various conditions with ImageJ, concluding that cell mechanotransduction is complex, multifaceted, and depends on both shear stress and shear rate

PROFESSIONAL EXPERIENCE

MedImmune, LLC*R&D Associate Scientist II, Cell and Fermentation*

Gaithersburg, MD

February 2014 – August 2014

- Led the development of robust cell culture processes suitable for clinical manufacture of antibodies, recombinant proteins, viruses and subsequent technology transfer
- Wrote SOP documentation for 1L and 3L Dargip and Applikon bioreactors, biomass OD scanners, and YSI analyzers to improve productivity and efficiency of researchers
- Implemented a new biomass scanner for the advanced evaluation of fermentation processes; presented results in poster format at an internal symposium

Luna Innovations*Summer Intern, Advanced Materials Group*

Blacksburg, VA

May 2010 – August 2010

- Evaluated the efficacy of manufactured coatings such as superhydrophobic textiles and sol-gel thin films
- Analyzed material hydrophobicity and anti-corrosive properties with contact angle analyses and moisture permeability, laundering, wash durability, and abrasion resistance tests

BC Genesis*Lab Manager*

Blacksburg, VA

August 2009 – April 2010

- Start-up member of a biotechnology company creating customizable meniscus implants by aligning fibers of bacterial cellulose in a 3D network via electrophoresis
- Constructed microfluidic devices and conducted tensile tests on tissue engineered samples
- Established necessary safety protocols, purchased biosafety equipment, and organized lab space for cell culture experimentation with a Class II Biological Safety Cabinet
- Presented success of technology as a marketable product to business collaborators and funding agencies at the 2009 South West Virginia Life Science Forum

Bioengineering and Bioinformatics Summer Institute

Undergraduate Researcher, Mechanical Engineering Department

Blacksburg, VA

May 2009 – August 2009

- Redesigned synthesis techniques fabricating a cost-effective polypyrrole-metal composite actuator for use in a lab-made biometric jellyfish and an expressive robotic head
- Orally communicated results to faculty members of the Virginia Tech – Wake Forest University School of Biomedical Engineering and Sciences and summer interns of the BBSI program

BAE Systems

Summer Intern, Failure Analysis I

Manassas, VA

May 2008 – August 2008

- Prepared samples and performed analytical SEM microscopy of 150nm CMOS semiconductors, carbon-nanotubes, microprocessing chips, and thermal imaging sensors
- Wrote test reports and submitted documentation to meet guidelines of Quality Assurance

TECHNICAL SKILLS

MATLAB, SolidWorks, Inventor, GraphPad Prism, ImageJ, MS Office, AutoCAD, Rhino, MIMICS, Minitab, CES Edupack 2009, Pronterface, Sli3r

LABORATORY SKILLS

Aseptic cell culture (human, animal, and bacterial), aortic cannulation (mouse, rat, rabbit hearts), aortic constriction in rats, optical mapping, organotypic slice culturing, stem cell harvesting, microfluidic design and fabrication, bioreactor design and fabrication, 3D printing, PCR, UV Spectrophotometry, histological staining and imaging, enzymatic assays, cell viability and metabolism assays, SEM sample preparation and imaging, FIB imaging, EDX analysis

PRESENTATIONS

Poster Presentation : **J. Brennan**, I. Efimov. "Differential Electrophysiological Effects of β 1- and β 2- Adrenergic Stimulation in the Isolated Canine Sinus Node." 2017 SEAS R&D Showcase, The George Washington University, Washington, DC; February 22, 2017.

Poster Presentation : **J. Brennan**, I. Efimov. "Differential Electrophysiological Effects of β 1- and β 2- Adrenergic Stimulation in the Isolated Canine Sinus Node." Gordon Research Conference (GRC) on Cardiac Arrhythmia Mechanisms, Ventura, CA ; February 5-10, 2017.

Poster Presentation : **J. Brennan**, I. Efimov. "Differential Electrophysiological Effects of β 1- and β 2- Adrenergic Stimulation in the Isolated Canine Sinus Node." Gordon Research Seminar (GRS) on Cardiac Arrhythmia Mechanisms, Ventura, CA ; February 4-5, 2017.

Poster Presentation : **J. Brennan**, K. Endicott, A. Moreno, G. Trachiotis, I. Efimov, M. Kay. "Optogenetic-mediated parasympathetic reduction of heart rate in a transgenic mouse model using micro LED illumination." 2016 BMES Annual Meeting (Cardiac Electrophysiology session), Minneapolis, MN; October 5-8 2016.

Poster Presentation : **J. Brennan**, Nathan Castro, L. Zhang. "Electrospinning a Smart Material Polymer for the Development of a Thermo-Responsive Vascular Graft." 2015 BMES Annual Meeting, Tampa, FL ; October 8, 2015.

Poster Presentation: **J. Brennan**, B. Holmes, L. Zhang. "3D Printed Microchannels to Create Networks of Endothelial Cells for the Development of a Tissue Engineered Blood Vessel." 2015 SEAS R&D Showcase, The George Washington University, Washington, DC; February 18, 2015.

Oral Presentation: M. Berge, S. Machhi, **J. Brennan**, V. Roy. "Developing a High Titer Defined Medium and Feed for E. coli Fermentation Systems." 2014 AIChE Annual Meeting, Atlanta, GA; November 16-21, 2014.

Oral Presentation: **J. Brennan**, E. Su, A. Babataheri, A. Barakat. "The Influence of Hemodynamic Forces and Intercellular Interactions on Endothelial Cell Migration." 10th International Congress on Coronary Artery Disease, Florence, Italy; October 14, 2013.

Oral Presentation : **J. Brennan**, E. Su, A. Barakat. "Flow-Induced Endothelial Cell Migration." 2013 BMES Annual Meeting at the Whitaker International Session, Seattle, WA; September 27, 2013.

Oral Presentation: **J. Brennan**, E. Su, A. Barakat. "The Influence of Hemodynamic Forces and Substrate Selection in Regulating Endothelial Cell Migration." 2013 Whitaker Enrichment Seminar, Budapest, Hungary; April 26, 2013.

Poster Presentation: **J. Brennan**, J. Arrizabalaga, M. Nollert. "Development of a Human Tissue Engineered Vascular Graft from Adipose-Derived Stem Cells." American Heart Association's Basic Cardiovascular Sciences 2012 Scientific Sessions, New Orleans, LA; June 25, 2012.

Oral Presentation: **J. Brennan**, M. Nollert. "Development of a Small-Diameter Vascular Graft Using the Human Amniotic Membrane." 2011 BMES Annual Meeting, Hartford, CT; October 13, 2011.

Poster Presentation: M. Sano, **J. Brennan**, P. Gatenholm. "Direct Control of Biological Assembly to Create Biocompatible Materials for Regenerative Medicine." SW Virginia Life Science Forum, Blacksburg, VA; October 2009. Mid-Atlantic Biotech Conference, Washington, DC; November 2009.

PUBLICATIONS

F.S. Ng, **J. Brennan**, I. Efimov. "Chapter 35: Optical mapping of arrhythmogenic remodeling in the failing human heart." *Cardiac Mapping 5th Edition* – Ed. Mohammad Shenasa, Ed. Gerhard Hindricks, Ed. Martin Borggrefe. John Wiley & Sons, Ltd. 2016. Print.

C. Gloschat, A. Koppel, K. Aras, **J. Brennan**, K. Holzem, I. Efimov. "Arrhythmogenic and Metabolic Remodeling of Failing Human Heart." *Journal of Physiology*, Jun 2016.

C. Kang, **J. Brennan**, S. Kuzmiak-Glancy, K. Garrott, M. Kay, I. Efimov. "Technical advances in studying cardiac electrophysiology – role of rabbit models." *Progress in Biophysics & Molecular Biology*, May 2016.

J. Brennan, J. Arrizabalaga, M. Nollert. "Development of a Small Diameter Vascular Graft Using the Human Amniotic Membrane." *Cardiovascular Engineering and Technology* (2013), DOI: 10.1007/s13239-013-0170-6.

INSTITUTIONAL LEADERSHIP

- DC Women in Bio MAPs (Mentors, Advisors, and Peers) Chapter Chair, 2016 – Present
- GW MAPs-U (Mentors, Advisors, and Peers - University) Founder and Chapter Chair, 2015 – Present
- GW Graduate Student Ambassador, 2015 – Present
- University of Oklahoma Bioengineering Graduate Student Senator, 2010 – 2012
- University of Oklahoma Graduate Council Member, 2010 – 2012

COMMUNITY SERVICE

- FLOC (For Love of Children) K-12 Saturday AM Math Tutor, 2015 – Present
- FLOC (For Love of Children) "Champion" Volunteer, 2015 – Present
- RESET Hands-On Science and Math Classroom Volunteer, 2014 – Present
- DC STEM Fair Engineering Judge – 2015
- Norman Middle School's "Botball" Robot Competition Volunteer, 2011 – 2012
- Norman Regional Hospital's X-Ray and Emergency Room Volunteer, 2010 – 2012
- Virginia Tech Chi Delta Alpha Community Service Organization, 2008 – 2010