

# Alexandra Tchir

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## EDUCATION

Associate of Arts, Broward College, Davie, FL Fall 2014 – Spring 2016

B.S in Biomedical Engineering & Biology, Florida International University, Miami, FL Fall 2016 –Spring 2020

- GPA 3.94

PhD. in Medical Engineering and Medical Physics, HST, MIT, Cambridge, MD September 2020 – TBD

## RESEARCH EXPERIENCE

**Research Assistant in CV-PEUTICS lab** August 2018 – April 2020

Department of Biomedical Engineering: FIU – Miami, FL.

- The objective of this study was to determine the effect of different oscillatory flow patterns as a mechanical regulator to heart valvular endothelial cells (VEC) and interstitial cells (VIC). Endothelial cells were seeded in a pneumatically driven microfluidics channel system and exposed to flow profiles of low, moderate and high oscillations. The media was collected and the interstitial cells grown in the conditioned endothelial cell media.
- Preliminary results using rat VEC and rat VICs have shown that in a hypercalcemic environment, calcification was high if the cells were exposed to high oscillatory flow. Calcification, a common cause for heart valve disease, was low in little to low oscillatory flow conditions. Investigations will continue on the gene expression of the cells and the histology of the calcium deposits.

**Research Assistant in Larman lab** June 2019- mid-August 2019

Department of Pathology: Johns Hopkins University – Baltimore, MD.

- I worked on a multiplexed assay for infectious disease diagnosis. The importance of this research comes from the lack of available methods for detecting the type of pathogen that a patient is infected with. The novelty of this assay will come from its high specificity, high capacity for diagnosing a large variety of pathogens, and cost-effectiveness. The assay implements probe-ligation based technology to target the genetic material of pathogens to test for multiple diseases at one time.
- The lower limit of detection of a model system was between  $>1$ -1000 molecules per mL. The negative controls for each sample all had below two reads per mL. In addition, the results showed linearity across decreasing logs of target organism concentration.

**Research Assistant in Mathee Lab for 65 Roses** September 2017 – April 2018

Department of Molecular Microbiology and Infectious Disease: FIU – Miami, FL.

- I contributed to a project partnered with the Public Health department to characterize the microbiomes of patients with HPV. We sequenced the samples and performed qPCR.
- I also assisted on a project whose goal was to determine the effect that a specific point mutation on a clinical strain had on the alginate producing pathway of *Pseudomonas*

*aeruginosa*. Alginate is produced when the bacteria is stressed to provide increased adhesion and protection. The lab found that a cystic fibrosis clinical strain, PA2192, had a novel mutation for Muca, an anti-sigma factor at the beginning of the alginate-producing pathway. I worked on some additional verification for these results. This finding was significant as we hypothesized that this mutation resulted in the truncation of the protein and caused double alginate production in PA2192 compared to other strains.

## **PUBLICATIONS**

Credle, J. J., Robinson, M. L., Gunn, J., Monaco, D., Sie, B., **Tchir, A.**, Hardick, J., Zheng, X., Shaw-Saliba, K., Rothman, R. E., Eshleman, S. H., Pekosz, A., Hansen, K., Mostafa, H., Steinegger, M., & Larman, H. B. (2020). Highly multiplexed oligonucleotide probe-ligation testing enables efficient extraction-free SARS-CoV-2 detection and viral genotyping. *bioRxiv : the preprint server for biology*, 2020.06.03.130591.

<https://doi.org/10.1101/2020.06.03.130591>

- Submitted to *Nature Biomedical Engineering*

## **PRESENTATIONS/POSTERS**

“The effect of oscillatory flow patterns on rat valvular endothelial and interstitial cells.”

Alexandra Tchir, Chia-Pei Hsu, Sharan Ramaswamy

- [Oral] Biology Honors Thesis Presentation. FIU, Miami, FL. April 2020.
  - o Awarded Second Place for Best Presentation

“Novel Highly Multiplexed RNA Detection Assay.”

Alexandra Tchir, H. Benjamin Larman, Joel Credle

- [Oral] ABRCMS. Engineering, Physics and Mathematics Session. Anaheim, CA. November 2019.
- [Oral] QBIC and Marc U\*STAR Research Symposium. FIU, Miami, FL. October 2019.
- [Oral] Undergraduate Research at the Capitol inaugural event with FURA. UF, Gainesville, FL. February 2020.

“Oscillatory Flow Magnitude-Effects on Stem Cell Gene Expression for Heart Valve Regenerative Medicine.”

Alexandra Tchir, Chia-Pei Hsu, Sharan Ramaswamy

- [Oral] BMES. Philadelphia, PA. Undergraduate Research & Design Orals session. October 2019.
- [Poster] Heart Research Day. FIU, Miami, FL. February 2019.

“Non-Linear CD31 Expression In Vascular Endothelial Cells In Response To Increasing Oscillatory Flow Conditions.”

Alexandra Tchir, Chia-Pei Hsu, Sharan Ramaswamy

- [Poster] SB3C, Summer Biomechanics, Bioengineering, Biotransport Conference. Seven Springs, PA. Poster Presenter in Undergraduate Competition. June 2019.
  - o Diversity Travel Award
- [Oral] QBIC and Marc U\*STAR Research Symposium. FIU, Miami, FL. April 2019.

“The effect of oscillatory shear index on communication between valvular endothelial and interstitial

cells.”

Alexandra Tchir, Chia-Pei Hsu, Sharan Ramaswamy

- [Oral] QBIC and Marc U\*STAR Research Symposium. FIU, Miami, FL. September 2018.
- [Poster] Biomedical Engineering Undergraduate Research Day. FIU, Miami, FL. September 2018.

## **RECOGNITION/HONORS**

April 2020: Alfred P. Sloan Scholarship as part of the University Center of Exemplary Mentoring program at MIT

February 2020: Nominated for Outstanding Student Life Award at FIU

December 2019: Third Place BME Senior Design Poster Expo \$50

December 2019: First Place BME Senior Design Showcase, \$750

July 2019: Diversity Travel Award @ Summer Biomechanics, Bioengineering, Biotransport Conference, \$350

June 2019: QBIC Summer Research Scholarship, \$1200

May 2019: Coulter Undergraduate Research Excellence Program (CURE) Researcher at FIU, (Declined, conflict with MARC), \$10 per hour/15hrs/week

Spring 2018: MARC U\*STAR Scholar

Spring 2017: Mickey Dane Memorial Biomedical Scholar, \$2,000/year

Fall 2016– Fall 2019: Dean’s List at FIU

Fall 2016: QBIC Scholar at FIU

Fall 2016: Honors College Scholar at FIU

Fall 2016: Federal Pell Grant

Fall 2016: Florida Academic Scholar (Bright Futures)

Fall 2016: FIU Presidential Scholar

Fall 2016: National Hispanic Scholar

## **COMMUNITY INVOLVEMENT**

### **Spring Break Outreach**

March 2019 and March 2020

- Visited TERRA Senior high school and gave a presentation about my research at FIU, my transition from high school to university, the challenges I overcame, tips for success in college, and my future goals.

### **Phi Delta Epsilon Fundraising events for Children’s Miracle Network**

January 2017 – January 2019

- Organization donated over \$24,000/year
- Anatomy Fashion Show, annual: Formal philanthropic event hosted by Phi Delta Epsilon that depicts various artist renditions of the anatomical traits of the human body. Worked as set-up and clean-up crew, painter, and model
- Stand For the Kids, annual: International day of philanthropy joins students in unison as they stand to raise funds and awareness
- Body Exhibit, annual: Painted models explain the importance of different parts of our body systems

- Bone Marrow Drive, annual: connects potential donors with thousands of patients suffering from blood cancers through a bone marrow registry

**Alternative Breaks Express Site Leader**

October 2018

- Partnered with Second Harvest Food Drive in Orlando, FL to volunteer for food security
- Coordinated and budgeted housing and volunteer experience for 6 participants to recover fresh produce and grocery products and package them for distribution to underprivileged families.

**SKILLS**

- MATLAB: 100+ hours
- R programming: Completed Coursera Data Scientist's Toolbox 20+ hours
- Solidworks: SolidWorks Mini-course at FIU 36 hours
- Cell Culture 50+ hours
- Conversant Spanish

**LEADERSHIP/INVOLVEMENT**

**Team Leader**

January 2019-December 2019

Senior Design Course, FIU – Miami, FL

- Responsibilities included maintaining progress, delegating tasks, managing relationships with outsiders, and more.
- Sponsored project with Kevin S. Garrison, owner of Garrison's Prosthetic Services and Certified & Licensed Prosthetist. The project, the Garrison Gauge, focuses on the clinical need to address fluctuating prosthetic socket fit. The prosthetist must quantitatively compare socket fit to the size of the limb to demonstrate to insurance companies that a new socket is required. With my team, I created an automated system that uses a laser distance sensor and several motors to drive the sensor along incremental height intervals and rotate 360 degrees. The device generates a reading of the perimeter along the height at every inch and a 3D model of the socket to compare measurements to the same location on a patient's residual limb.

**Treasurer**

August 2018 – May 2020

Undergraduate Research Society, FIU – Miami, FL

- Research and Professional Development Club
- Planning Committee for Eighth Annual Women in Science Seminar March 2020
- Treasurer August 2019- May 2020
- CSO Representative from October 2018- April 2019

**Programming Chair**

January 2018-January 2019

Phi Delta Epsilon, FIU – Miami, FL

- Organized two sessions of a Phlebotomy Training course for 50 fraternity members with MedTrain
- Organized an Alternative Breaks trip with Second Food Harvest
- Helped to organize the annual social retreat at Camp Owaissa Bauer

- Help to organize the Body Exhibit 2018
- Member since January 2017

**Quantitative Methods Workshop**

January 2018

MIT – Cambridge, MD

- “A week-long intensive workshop with hands-on computer labs to apply quantitative tools and programming languages, such as Python, MATLAB and R, to experimental data analysis.”
- Daily lectures from faculty in the MIT Biology Department and NSF-Funded Center for Brains, Minds and Machines (CBMM).

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## REFERENCES

**Kathryn Bond**

Program Coordinator

Quantifying Biology in the Classroom (QBIC) Program

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**Amy Reid, M.A.**

Senior Program Coordinator

MARC U\*STAR

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**Dr. Sharan Ramaswamy, PhD**

Associate Professor

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