

MICHAEL A. STRAKER, M.S.

MEMS Sensors and Actuators Laboratory (MSAL)
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EDUCATION

- Ph.D. University of Maryland, College Park, MD** **May 2025**
Bioengineering
Advisor: Dr. Reza Ghodssi
GPA: 3.83/4.0
- M.S. Morgan State University, Baltimore, MD** **December 2020**
Science – Physics
Thesis: “*Growth and Characteristics of Single Crystalline Boron Carbide*”
Advisor: Dr. Michael G. Spencer
GPA: 3.87/4.0
- B.A. Temple University, Philadelphia, PA** **May 2016**
Bioengineering
- Drexel University, Philadelphia, PA** **September 2012 – June 2013**
Biology

RESEARCH EXPERIENCE

- Graduate Research Assistant** **April 2021-Present**
MEMS Sensors and Actuators Laboratory (MSAL)
University of Maryland, College Park, MD
Principal Investigator: Dr. Reza Ghodssi
- ❖ Development of a bilayer packaging system for the targeting operation of an ingestible device.
 - ❖ Developing a tissue biopsy system for ingestible capsule devices for GI tract monitoring.
- Graduate Research Assistant** **August 2018-August 2020**
Spencer Lab
Morgan State University, Baltimore, MD
Principal Investigator: Dr. Michael G. Spencer
- ❖ Researched the growth and characterization of single crystal boron carbide for use in impact testing.
 - ❖ Evaluated mechanical and electrical properties of boron carbide.
- Research Fellow** **Summer 2019, Summer 2018**
Hopkins Extreme Materials Institute (HEMI), PARADIM Lab
Johns Hopkins University, Baltimore, MD
Principal Investigator: Dr. W. Adam Phelan
- ❖ Researched the growth and characterization of large diameter single crystal boron carbide.
 - ❖ Investigated mechanical properties of boron carbide.
- Research Fellow** **January 2018-May 2018**
Ozturk Lab
Morgan State University, Baltimore, MD
Principal Investigator: Dr. Birol Ozturk
- ❖ Development of an inexpensive scanning electrochemical microscope for nanoscale biosensing.
 - ❖ Developed force feedback load cell module for microscope operation.
- Undergraduate Research** **May 2015-May 2016**
Department of Bioengineering, Senior Design
Temple University, Philadelphia, PA
Project: “*Stereoscopic Infrared Imaging Device*”
Advisor: Dr. Chetan Patel
- ❖ Designed the optomechanical layout of the imaging device allowing for multifocal adjustments.
 - ❖ Fabricated and tested the full device on mock retina for device validation.

Undergraduate Research Assistant 2013-2014
 Integrated Cellular Tissue Engineering and Regenerative Medicine Laboratory
 Temple University, Philadelphia, PA
 Advisor: Dr. Peter Lelkes

- ❖ Investigated the tensile strength and cyclical loading limits of microdiamond infused polymer scaffolds for use as biodegradable ACL reattachment grafts.
- ❖ Conducted PID tuning to mimic mechanical loading cycles of routine joint movement.

HONORS & AWARDS

International Conference Student Support Award (ICSSA) Spring 2023
 University of Maryland, College Park, USA

J.K. Goldhaber Travel Grant Spring 2022
 University of Maryland, College Park, USA

Clark Doctoral Fellowship Fall 2020
 University of Maryland, College Park, USA

1st Place Graduate Poster Presentation, ICAAC 2020 January 2020
 Hilton Daytona Beach Resort, Daytona Beach, USA

1st Place Graduate Poster Presentation, National Technical Association Conference Fall 2019
 Coppin State University, Baltimore, USA

HEMI/ PARADIM Fellow Summer 2018, 2019
 Johns Hopkins University, Baltimore, USA

Dean's List (3.6 GPA or higher) Fall 2015
 Temple University, Philadelphia, USA

A.J. Drexel Academic Scholarship Fall 2012-Spring 2013
 Drexel University, Philadelphia, US

TEACHING AND LEADERSHIP

University of Maryland College Park - Department of Bioengineering

Graduate Teaching Assistant Spring 2022
 Biology for Engineers Laboratory (BIOE121-Spring 2022)

- ❖ Responsibilities involved preparing and grading assignments/lab reports and moderating lab sessions.
- ❖ Topics included biopolymer hydrogel formulation, bacteria cell culture, and mammalian cell culture etc.

Graduate Teaching Assistant Fall 2022
 Design and Fabrication of Micro-Electro-Mechanical Systems (MEMS) (ENEE605-Fall 2022)

- ❖ Facilitated a semester-long group project for four students to develop an ingestible device concept to detect treat post operative ileus.
- ❖ Responsibilities include preparing and grading homework, updating course lecture slides, and holding weekly office hours covering fundamental concepts ranging from IC fabrication to microfluidics, etc.

PUBLICATIONS

1. **Straker, M.A.**, Levy, J.A., Stine, J.M., Borbash, V., Beardslee, L.A., and Ghodssi, R., "Freestanding region-responsive bilayer for Functional Packaging of Ingestible Devices," *Microsyst. Nanoeng.*, vol. 9, no. 61, 2023, doi: 10.1038/s41378-023-00536-w.
2. Levy, J.A., **Straker, M.A.**, Stine, J.M., Beardslee, L.A., Borbash, V. and Ghodssi, R., "Thermomechanical Soft Actuator for Targeted Delivery of Anchoring Drug Deposits to the GI Tract," *Adv. Mater. Technol.*, vol. 8, no. 2, pp. 2370009, Feb. 2023, doi: 10.1002/admt.202370009.
3. Zare, A., He, M.R., **Straker, M.**, Chandrashekhare, MVS, Spencer, M., Hemker, K.J., McCauley, J.W., and Ramesh, K.T., "Mechanical characterization of boron carbide single crystals," *J. Am. Ceram. Soc.*, vol. 105, no. 5, pp. 3030-3042, May 2022, doi: 10.1111/jace.18065.
4. **Straker, M.**, Chauhan, A., Sinha, M., Phelan, W. A., Chandrashekhar, M. V. S., Hemker, K. J., Marvel, C., and Spencer, M., "Growth of High Purity Zone-Refined Boron Carbide Single Crystals by Laser Diode Floating Zone Method." *Journal of Crystal Growth*, vol. 543, Aug. 2020, doi: 10.1016/j.jcrysgro.2020.125700.

5. Guver, A., Fifita, N., Milas, P., **Straker, M.**, Guy, M., Green, K., Yildirim, T., Unlu, I., Yigit, M. V., and Ozturk, B., "A Low-Cost and High-Precision Scanning Electrochemical Microscope Built with Open Source Tools," *HardwareX*, vol. 6, Oct. 2019, doi: 10.1016/j.ohx.2019.e00082.

CONFERENCE PROCEEDINGS & PRESENTATIONS

1. **M. A. Straker**, J. A. Levy, J. M. Stine, J. Han, L. A. Beardslee, and R. Ghodssi, "Seropill: Novel Minimally Invasive Ingestible Capsule for Serotonin Sensing in the GI Tract," *The 22nd International Conference on Solid-State Sensors, Actuators and Microsystems*, Kyoto, Japan, June 25-29, 2023.
2. J. Han, J. M. Stine, T. Ho, **M. A. Straker**, J. Herberholz, and R. Ghodssi, "Implantable Biosensor for Continuous Serotonin Detection in Freely Moving Crayfish," *The 22nd International Conference on Solid-State Sensors, Actuators and Microsystems*, Kyoto, Japan, June 25-29, 2023.
3. J. A. Levy, **M. A. Straker**, L. A. Beardslee, and R. Ghodssi, "Cantilever Actuator Module for On-Command Drug Deployment from Ingestible Capsules," *The 22nd International Conference on Solid-State Sensors, Actuators and Microsystems*, Kyoto, Japan, June 25-29, 2023.
4. **M. A. Straker**, J. A. Levy, J. M. Stine, V. Borbash, L. A. Beardslee, and R. Ghodssi, "Region-targeted Bilayer Coating Technology for Ingestible Devices and Systems," *Hilton Head Workshop 2022: A Solid-State, Sensors, Actuators, and Microsystems Workshop*, Hilton Head, SC, June 5-9, 2022.
5. J. A. Levy, **M. A. Straker**, L. A. Beardslee, and R. Ghodssi, "Biomimetic Anchoring System for Sustained and Localized Gastrointestinal Drug Delivery," *Hilton Head Workshop 2022: A Solid-State, Sensors, Actuators, and Microsystems Workshop*, Hilton Head, SC, June 5-9, 2022. **Oral Presentation.**
6. **M. A. Straker**, A. Chauhan, M. Sinha, W. Phelan, M. Chandrashekhar, K. J. Hemker, and M. Spencer, "Growth of high purity zone-refined boron carbide single crystals by laser diode floating zone method," *44th International Conference and Expo on Advanced Ceramics and Composites (ICACC 2020)*, Daytona Beach, FL, January 26-31, 2020.
7. **M. A. Straker**, A. Chauhan, M. Sinha, W. Phelan, M. Chandrashekhar, K. J. Hemker, and M. Spencer, "Floating Zone Crystal Growth and Characterization of Boron Carbide," *National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE) Meeting 2019*, St. Louis, MO, November 18-21, 2019.
8. **M. A. Straker**, A. Chauhan, M. Sinha, W. Phelan, M. Chandrashekhar, K. J. Hemker, and M. Spencer, "Floating Zone Crystal Growth and Characterization of Boron Carbide," *National 91st Annual National Technical Association Conference*, Baltimore, MD, September 25-27, 2019.
9. **M. A. Straker**, A. Chauhan, M. Sinha, W. Phelan, M. Chandrashekhar, K. J. Hemker, and M. Spencer, "Floating Zone Crystal Growth and Characterization of Boron Carbide," *National Nanotechnology Coordinated Infrastructure (NNCI) REU Convocation*, Ithaca, NY, August 10-13, 2019. **Oral Presentation.**
10. **M. A. Straker**, A. Chauhan, M. Sinha, W. Phelan, M. Chandrashekhar, K. J. Hemker, and M. Spencer, "Mechanical and Electrical Transport Properties Characterization of Single Crystal Boron Carbide," *Hopkins Summer Research Symposium*, Baltimore, MD, July 25, 2019.
11. **M. A. Straker**, A. Chauhan, M. Sinha, W. Phelan, M. Chandrashekhar, K. J. Hemker, and M. Spencer, "Growth, Preparation, and Characterization of Boron Carbide," *The Hopkins Extreme Materials Institute MACH Conference 2019*, Annapolis, MD, April 3-5, 2019. **Oral Presentation.**
12. **M. A. Straker**, A. Chauhan, M. Sinha, W. Phelan, M. Chandrashekhar, K. J. Hemker, and M. Spencer, "Crystal Growth and Characterization of Boron Carbide," *The MEDE 2018 Fall Meeting*, Cumberland, MD, October 9th, 2018.
13. **M. A. Straker**, A. Chauhan, M. Sinha, W. Phelan, M. Chandrashekhar, K. J. Hemker, and M. Spencer, "Crystal Growth and Characterization of Boron Carbide," *Hopkins Summer Research Symposium*, Baltimore, MD, August 2, 2018.
14. **M. A. Straker**, "Bioengineering and My Academic Journey," *Hopkins Engineering Innovation – Career Connections 2018*, Baltimore, MD, July 14, 2018. **Oral Presentation.**

PATENTS PENDING

1. Ashley A. Chapin, Luke A. Beardslee, Reza Ghodssi, Joshua A. Levy, **M. A. Straker**, “Systems and Methods for Medical Device Anchoring,” Pub No. US 2022/0401024, Published Dec. 22, 2022.
 - ❖ Contributed to the development and realization of the concept, experimental data, analysis, and write-up of the project’s research.
2. **M. A. Straker**, J. A. Levy, R. Ghodssi, J. M. Stine, and L. A. Beardslee, “Freestanding Region-Responsive Bilayer”, (Provisional Patent ID Pending) Dec. 19, 2022.
 - ❖ Contributed to the development of the concept, realization of the concept, experimental data, analysis, and write-up of the project’s research and patent disclosure.
3. J. M. Stine, L. A. Beardslee, R. Ghodssi, P. J. Pasricha, J. A. Levy, **M. A. Straker**, B. Holt, V. Borbash, H. Abianeh, “Bioimpedance Sensor-integrated Capsule for Monitoring”, U.S. Provisional Application No. 63/365845, Filed on June 03, 2022.
 - ❖ Contributed to the realization of the concept, experimental data, and write-up of the project’s invention disclosure.

References available upon request

Last updated on April 12th, 2023