

ELLA A. HUSHKA

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EDUCATION

UNIVERSITY OF COLORADO

Department of Chemical and Biological Engineering
Graduate Student, Advisor: **Kristi S Anseth, Ph.D.**
GPA: 3.74/4.00

Boulder, CO.
2018 - Present

UNIVERSITY OF COLORADO

B.S. Chemical and Biological Engineering *with honors*
Major GPA: 3.87/4.00
Engineering Honors Program
Tau Beta Pi National Engineering Honor Society
College of Engineering Dean's List

Boulder, CO.
2015-2018

2015-2018

2015-2018

2015-2018

HONORS & AWARDS

Graduate Research Fellowship Program National Science Foundation
Awardee

April 2020

Graduate Assistantship for Areas of National Need US Dept of Education
Assistantship Recipient & Member of Student Leadership Team

Jan 2019 - Present

Graduate Research Fellowship Program National Science Foundation
Honorable Mention

April 2018

Outstanding Undergraduate Research Award University of Colorado
Department of Chemical and Biological Engineering

May 2018

Dean's Outstanding Merit Fellowship University of Colorado
Graduate School, Department of Chemical and Biological Engineering

August 2018

Top Scholar Award University of Washington
Awarded to 2 PhD students from any UW Graduate School Dept. (offer declined)

August 2018

Biological Sciences Initiative Scholar Howard Hughes Medical Institute at CU
Selected by research proposal application for competitive research grant

May 2016 – May 2017

Conference Keynote Speaker Colorado Association for the Talented and Gifted
Invited to speak to 1000 educators about closing the gender gap in engineering

October 2016

Future Leader Award Society of Women Engineers
1 of 22 (from 16,000 international members) selected for demonstrated leadership

October 2015

Top Student in General Chemistry for Engineers University of Colorado
Received the highest final exam & overall course grade in 100+ student course

May 2015

GOLD Student Organization of the Year Award University of Colorado
Received as Society of Women Engineers leader for outstanding positive change

May 2016

Presidential Environmental Youth Award, Environmental Protection Agency
Only 2-time recipient for plastic bag ordinance implementation & pesticide regulation

May 2014

EXPERIENCE

University of Colorado Principal Investigator: Dr. Kristi S. Anseth
Graduate Research Assistant

Boulder, CO
August 2018- Present

- Developing synthetic and dynamic hydrogel platforms to promote intestinal organoid formation and maturation from intestinal stem cells.
- Utilizing hydrogel platforms to test hypotheses related to intestinal organoid mechanosensing using phototunable hydrogels.

Biological Sciences Initiative Scholar (HHMI-BURST)

May 2016 – May 2017

- Identified a temporal correlation between YAP and α SMA activation in vavular interstitial cells (VICs) during cell conversion from fibroblasts to myofibroblasts in the wound healing process. Utilized spatially patterned phototunable hydrogels to model matrix elasticity in diseased and normal state heart valves.
- Synthesized and purified hydrogel reagents, ie PEGdiPDA, using dialysis, column chromatography and HPLC.

Senior Thesis

August 2017-May 2018

- Investigated the use of HDAC inhibition in human mesenchymal stem cells (hMSC) for preventing or reversing mechanical memory for the application of maintaining hMSC's "stemness" during cell culture for *in vivo* and *in vitro* applications. 2D photodegradable hydrogel systems are used to mechanically dose cells.
- Participates in independent and group research projects with experiment planning, hydrogel synthesis, reformulation and degradation. Sterile cultures VICs and hMSCs on tissue culture plastic and 2D hydrogel systems. Fixed, immunostained and imaged cells on Operetta and confocal microscope.

Undergraduate Research Opportunity Program

May 2017 – August 2017

- Developed a novel, phototunable, Poly(ethylene) glycol hydrogel system that can be degraded faster than most hydrogels in the field, avoiding problems associated with exposing cells to UV light. Further, the gels can be uniquely restiffened and resoftened, allowing for a highly controllable platform to study mechanical memory.
- Performed rheology, MTS, hydrogel synthesis and modulus alternation via photodegradation, and cell culture.

ArcherDX NGS Cancer Diagnostics

Boulder, CO

Intern

May 2015 – August 2015

- Wrote and published white papers, press releases and website content for multiple Cancer Diagnostic panels.
- Led and developed ArcherDX's first standardized ecommerce, order shipping and fulfillment system, allowing the exponentially growing business to meet and exceed the high demand for the cancer diagnostic assays.
- Established company's 1st Google Remarketing Campaign resulting in 200% more website traffic and sales.

University of Colorado Mentor: Dr. John Falconer

Boulder, CO

High School Research Fellow

May 2013-August 2013

- Developed artificial zeolite membranes for size exclusion separations, used principally with gaseous mixture separations for the application of refining natural gas.

LEADERSHIP

Graduate Assistantship in Areas of National Need

Boulder, CO

GAANN Student Leadership Team Member, Outreach Events Chair

Jan 2019 - Present

- Oversaw and organized over seven community outreach events for GAANN recipients to volunteer with including high school science fair judging, engineering workshops for middle school students and tutoring.
- Organized & spoke on a panel for a graduate school Q&A for undergraduate students in the Broadening Opportunity and Leadership Program at CU (an organization that serves underrepresented engineering students)

Society of Women Engineers

Boulder, CO

Section Treasurer, Secretary, Region i Conference Special Events Chair

Jan 2015 – Present

- Managed and allocated finances totaling over \$10,000, including two accounts and two credit cards.
- Successfully applied for grants to fund society career fairs, conference travel and community outreach.
- Researched and identified unmet causes and solutions for the gender gap in engineering.
- Presented in classrooms to educators and students and as a keynote speaker for a 2016 Colorado Educators conference about closing the gender gap. Additionally, leads intro-engineering projects with young girls.

Engineering Honors Program

Boulder, CO

Research Liaison

August 2017 – May 2018

- Co-lead three information sessions for Engineering Honors Program and Global Engineering Program students at CU Boulder. These covered why and how to get involved in academic research, how to present and share your research and then a poster session for students and a Q&A with principal investigators at CU.

Kumon Learning Center

Superior, CO

Supervisor, Tutor

May 2014 – January 2015

- Managed employees during their tasks of tutoring, grading and aiding early learners.
- Monitored student's progress and adapted student's learning programs accordingly.

PUBLICATIONS

Ella A. Hushka, F. Max Yavitt, Tobin E. Brown, Peter J. Dempsey, Kristi S. Anseth. The Relaxation of Extracellular Matrix Forces Directs Crypt Formation and Architecture in Intestinal Organoids. *Advanced Healthcare Materials* (<https://doi.org/10.1002/adhm.202070022>).

F. Max Yavitt, Tobin E. Brown, Ella A. Hushka, Nikolce Gjorevski, Peter J. Dempsey, Matthias P. Lutolf, Kristi S. Anseth. The effect of thiol structure on allyl sulfide photodegradable hydrogels and their application as a degradable scaffold for organoid passaging. *Advanced Materials* (<https://doi.org/10.1002/adma.201905366>).

Killaars, A. R., Grim, J. C., Walker, C. J., Hushka, E. A., Brown, T. E., & Anseth, K. S. (2019). Extended Exposure to Stiff Microenvironments Leads to Persistent Chromatin Remodeling in Human Mesenchymal Stem Cells. *Advanced Science*, 6(3), 1801483. (<https://doi.org/10.1002/advs.201801483>)

PUBLICATION Covers

Ella A. Hushka, F. Max Yavitt, Tobin E. Brown, Peter J. Dempsey, Kristi S. Anseth. The Relaxation of Extracellular Matrix Forces Directs Crypt Formation and Architecture in Intestinal Organoids. *Advanced Healthcare Materials* Special Issue: Biomaterials in Mechanobiology, April 22, 2020.



PRESENTATIONS

- Ella Hushka, Anouk Killaars, Kristi S. Anseth. "The Use of HDAC and HAT Inhibitors to Control Human Mesenchymal Stem Cell Mechanical Memory." May 2018, CU's Department of Chemical and Biological Engineering, Oral Defense of Senior Thesis.
- Ella Hushka, Anouk Killaars, Kristi S. Anseth. "PEG Cell Culture Platform with *in situ* tunable mechanical properties to study the (ir)reversibility of MSC fate." May 2017, CU's Department of Chemical and Biological Engineering Summer Research Symposium.
- Ella Hushka, Anouk Killaars, Kristi S. Anseth. "PEG Cell Culture Platform with *in situ* tunable mechanical properties to study the (ir)reversibility of MSC fate." May 2017, HHMI Biological Sciences Initiate Scholar's Oral Defense of Academic Year Program Research.
- Ella Hushka. "Bridging the Gender Gap in Engineering." October 2016, **Colorado Association for the Gifted and Talented National Conference**.
- Ella Hushka, Anouk Killaars, Hao Ma, Kristi S. Anseth. "Temporal correlation between YAP and α SMA activation in Vavular Interstitial cells." August 2016, CU's Department of Chemical and Biological Engineering Summer Research Symposium
- Ella A. Hushka, F. Max Yavitt, Tobin E. Brown, Peter J. Dempsey, Kristi S. Anseth. The Relaxation of Extracellular Matrix Forces Directs Crypt Formation and Architecture in Intestinal Organoids. August 2019, Cell Symposia.

TEACHING

CHEN 3320 - Chemical Engineering Thermodynamics: Graduate Student TA August – December 2018

- Writes homework solutions, grades homework and exams, proctors exams and attends office hours to answer student questions.

CHEN 3320 - Chemical Engineering Thermodynamics: Advanced TA August – December 2020

- Writes homework assignment, grades homework and exams, proctors exams, hosts office hours to answer student questions, and calculate final grades.

SKILLS

Cell Culture and Synthesis

- Sterile cell culture including cell plating, passaging, and seeding.
- Immunofluorescent Anti-body staining
- Isolation of vavular interstitial cells and mesenchymal stem cells

- RNA isolation, cDNA synthesis, RT-qPCR
- PEG hydrogel synthesis
- PEGdiPDA synthesis
- PEG-DBCO synthesis
- Dialysis
- Lyopholization
- MTS

Analytical

- IR spectroscopy
- Confocal and Fluorescence microscopy
- Rheology
- Harmony Image Analysis software
- Aspen Plus & Aspen HYSYS
- ImageJ

- Prism
- NMR, gas chromatography
- Omnicure UV lamp systems
- MATLAB
- Mathematica
- Microsoft Visio
- HTML, CSS, Salesforce, Adobe Suite, SEO Best Practices
- LabView