

Ian Marozas

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EDUCATION

UNIVERSITY OF COLORADO, BOULDER

Ph.D. candidate in Chemical and Biological Engineering

- Advisor: Kristi S. Anseth
- GPA 3.75/4.00

BOULDER, CO
August 2013 - Present

UNIVERSITY OF ROCHESTER

Bachelor of Science in Biomedical Engineering

Concentration in Cell and Tissue Engineering

Minor in Chemical Engineering

- Graduated Cum Laude in the Hajim School of Engineering and Applied Sciences
- Overall GPA 3.72/4.00, Major GPA 3.70/4.00, Minor GPA 3.82/4.00

ROCHESTER, NY
May 2013

RESEARCH EXPERIENCE

DEPARTMENT OF CHEMICAL AND BIOLOGICAL ENGINEERING

UNIVERSITY OF COLORADO, BOULDER

BOULDER, CO

Funded by NSF GRFP

I am designing materials that can be used to probe and study the response of cells to changes in the mechanical signals of their microenvironment. With a growing appreciation for the influence that viscoelasticity has on cellular processes, it is important to have tools to study how short- and long-timescale viscoelastic signals affect cellular behavior. To address this niche, I designed two hydrogel systems that present cells with short- and long-timescale viscoelastic signals. For the study of short-timescale viscoelastic signaling, I designed a hydrogel system that is capable of rapid photoinduced viscoelasticity. I utilized a photoinitiated addition fragmentation chain-transfer (AFCT) reaction to produce crosslinks that are covalently adaptable only where and when the light is exposed. The system recovers elasticity upon removal of light and can become viscoelastic again with a reproducible G'' during subsequent exposures to light. Furthermore, the magnitude of G'' can be modified by increasing the intensity of light and also by increasing the concentration of 8-arm PEG-thiol in the system. This system is being used to study the response of cells to very sudden changes in the viscoelastic properties of their microenvironment. For the study of long-timescale viscoelastic signaling, I designed a hydrogel system capable of tunable and persistent viscoelasticity. I incorporated dynamic covalent crosslinks into the hydrogel by exploiting the reversible reaction between boronic acids and *cis*-diols. By changing the concentration and stoichiometry of the reactive groups, the mechanical properties of the resulting material can be altered. This system is being used to study the response of cells to persistent viscoelastic mechanical signals.

DEPARTMENT OF BIOMEDICAL ENGINEERING

UNIVERSITY OF ROCHESTER

**Development of a Targeted Drug Delivery
System for the Treatment of Osteoporosis**

ROCHESTER, NY
Funded by Xerox
Spring 2012-Summer 2013

Worked on creating a targeted drug delivery system using a graft co-polymer. The delivery platform incorporated a small drug shown to increase osteoblast proliferation and survival, in a way that it could be released at the site of action in a controllable manner. We planned to incorporate the free-radical sensitive drug into the delivery platform using a copper-free “click” chemistry approach. Additionally, a small peptide dubbed TBP, which displays a very high affinity towards sites of bone remodeling, was used as a targeting moiety to hone the delivery platform to sites of bone growth. Performed various analytical chemistry techniques to confirm desired products, including Nuclear Magnetic Resonance (NMR), Liquid Chromatography-Mass Spectrometry (LC-MS), Matrix Assisted Laser Desorption/Ionization – Time of Flight (MALDI-TOF), and High Performance Liquid Chromatography (HPLC). Used cell culture skills to assess the effectiveness of the therapeutic compound and various polymer architectures on increasing osteoblast bone production.

DEPARTMENT OF BIOENGINEERING

UNIVERSITY OF CALIFORNIA, BERKELEY

Choanoflagellate Cloning: Isolation, Culture, and Recovery

BERKELEY, CA
Funded by the NSF
Summer 2011

Member of a two-person team that designed and created a novel microfluidic device. Used AutoCAD software to design the device, and soft lithography to create it. The device was designed to isolate genetically modified Choanoflagellates for an extended period of time. It was also designed so that the desired Choanoflagellates could be extracted from the device and used to create a colony outside of the device.

DEPARTMENT OF CHEMICAL AND BIOLOGICAL ENGINEERING

AMES, IA

Molecular Modeling of Gold Nanoparticles and Human Serum Albumin**Summer 2010**

Independent member of a project in which I used the programs Visual Molecular Dynamics in conjunction with NAMD to create an accurate computer model describing the short and long-term interactions between gold nanoparticles and human serum albumin.

DEPARTMENT OF BIOMEDICAL ENGINEERING
UNIVERSITY OF ROCHESTER

ROCHESTER, NY

Pig Telemetry Analysis**Fall 2009 – Fall 2010**

- Member of a two-person research team that worked to convert pig telemetry data into a readable format utilizing MATLAB. We then analyzed the data to discover patterns that may lead to sudden cardiac death.

TEACHING EXPERIENCE

- Kinetics and Biokinetics: Advanced Teaching Assistant, Spring 2016
- Chemistry for Engineers: Teaching Assistant, Spring 2014
 - Taught all recitations every week and held office hours to review materials with students.
- Tau Beta Pi: Tutor, Spring 2013
 - Tutored small groups of students. Reviewed the course material and to help students study for their examinations.
- BME 201P, MATLAB for BME: Teaching Assistant, Fall 2011
 - Led MATLAB workshops. Taught students various MATLAB tools through a series of programming tasks. Held additional office hours to assist students with final projects and lecture related topics.
- Chemical Concepts, Systems, and Practices I: Teaching Assistant, Fall 2010
 - Held independent chemistry workshops. Taught students basic chemical concepts through chemistry problems and also graded student homework. Held additional office hours to prepare students for exams and to assist with homework and lecture related topics.
- Sarphatie Education Inc: AP Biology and Chemistry Tutor, Spring 2010-Spring 2012
 - Privately tutored high school students in biology and chemistry. Led review sessions to prepare students for the Advanced Placement (AP) Biology and Chemistry exams and assisted students with homework.

PUBLICATIONS

- Brown, T. E., **Marozas, I.A.**, et al. Secondary photocrosslinking of click hydrogels to probe myoblast mechanotransduction in three dimensions. *J. Am. Chem. Soc. jacs.8b07551* (2018). DOI: [10.1021/jacs.8b07551](https://doi.org/10.1021/jacs.8b07551)
- Maureen Newman, **Marozas, I.A.**, et al. Multivalent Presentation of Peptide Targeting Groups Alters Polymer Biodistribution to Target Tissues. *Biomacromolecules*. 19, 1 (2017) DOI: [10.1021/acs.biomac.7b01193](https://doi.org/10.1021/acs.biomac.7b01193)
- Hodgson, S. M., **Marozas, I. A.**, et al. Reproducible Dendronized PEG Hydrogels via SPAAC Cross-Linking. *Biomacromolecules* (2017). DOI: [10.1021/acs.biomac.7b01115](https://doi.org/10.1021/acs.biomac.7b01115)
- **Marozas, I. A.***, Brown, T. E. *, & Anseth, K. S. Amplified Photodegradation of Cell-Laden Hydrogels via an Addition-Fragmentation Chain Transfer Reaction. *Adv. Mater.* 29, (2017). DOI: [/10.1002/adma.201605001](https://doi.org/10.1002/adma.201605001)
- **Marozas, I.A.**, Azagarsamy, M.A., Spaans, S., Anseth, K.S. Photoregulated Hydrazone-Based Hydrogel Formation for Biochemically Patterning 3D Cellular Microenvironments. *ACS Macro Letters*. 2015. DOI: [10.1021/acsmacrolett.5b00682](https://doi.org/10.1021/acsmacrolett.5b00682)
- **Marozas, I.A.**, Grim, J. C., Anseth, K.S. Thiol-ene and photo-cleavage chemistry for controlled presentation of biomolecules in hydrogels. *Controlled Release*. 2015. DOI: [10.1016/j.jconrel.2015.08.040](https://doi.org/10.1016/j.jconrel.2015.08.040)

PRESENTATIONS

- **Marozas, I.A.**, Cooper-White, J. J., Anseth, K. S., Boronate functionalized hydrogels with tunable viscoelastic properties to study cellular mechanotransduction. Abstract Accepted for World Polymer Congress MACRO18.
- **Marozas, I.A.**, Brown T.E., Cooper-White J.J., Anseth K.S. Photoinduced viscoelasticity to study cellular mechanotransduction. October 11, 2017. Oral presentation at the Society for Rheology annual meeting.
- **Marozas, I.A.**, Brown T.E., Cooper-White J.J., Anseth K.S. Photoinduced viscoelasticity to study cellular mechanotransduction. April 4, 2017. Oral presentation at the Whitaker Fellowship Enrichment Seminar.

- **Marozas, I.A.,** Brown T.E., Anseth.K.S. Addition-fragmentation chain transfer crosslinked hydrogels for rapid photoinduced degradation and stress-relaxation. November 11, 2016. Oral Presentation at the Australasian Polymer Symposium.
- **Marozas, I.A.,** Azagarsamy, M.A., Spaans, S., Anseth, K.S. Photoregulated hydrazone-based hydrogel formation for biochemically patterning 3D cellular microenvironments. University of Colorado Chemical Engineering Department Student Annual Research Symposium. October 10, 2015.
- **Marozas, I.A.,** Azagarsamy, M.A., Spaans, S., Anseth, K.S. Photoregulated Hydrazone-Based Hydrogel Formation for Biochemically Patterning 3D Cellular Microenvironments. May 17, 2016. Poster presentation at the World Biomaterials Congress
- **I. A. Marozas,** D. Alge, K.S. Anseth. Thiol-ene photo-click chemistry as an approach for user-directed protein tethering to hydrogel scaffolds. March 17, 2015. Oral presentation at the American Chemical Society national meeting
- **I. Marozas,** C. Schmitt, and D.S.W. Benoit. Development of a Novel Targeted Drug Delivery System for the Treatment of Osteoporosis. April 19, 2013. Oral presentation at the University of Rochester Undergraduate Research Exposition.
- **I. Marozas,** E. Starr, and N. King. Choanoflagellate Cloning: Isolation, Culture and Recovery. November 9-12, 2011. Oral presentation at the Annual Biomedical Research Conference for Minority Students (ABRCMS)

HONORS AND AWARDS

- Whitaker Fellowship with Justin Cooper-White at the University of Queensland: Fall 2016-Fall 2017
- National Science Foundation (NSF) Graduate Research Fellowship: Summer 2014-Summer 2018
- National Defense Science and Engineering Graduate Fellowship: Awarded Spring 2014 (Declined for NSF)
- Ford Foundation Predoctoral Fellowship: Awarded Spring 2014 (Declined for NSF)
- American Indian Graduate Center (AIGC) Fellowship: Fall 2013 – Spring 2014
- Alpha Eta Mu Beta National Biomedical Engineering Honor Society: Spring 2013 - Present
- President's Choice Award, University of Rochester Undergraduate Research Exposition: Spring 2013
 - Awarded to an undergraduate at the University of Rochester Undergraduate Research Exposition with the best oral research presentation.
- Faculty Choice Award for Excellence in Research, University of Rochester Biomedical Engineering Department: Spring 2013
 - Awarded to a student in the Biomedical Engineering department whose dedication to research has resulted in an oral presentation or publication.
- Tau Beta Pi National Engineering Honor Society, New York Kappa: Fall 2012 – Present
- Institute of Electrical and Electronics Engineers (IEEE) Award, Rochester Engineering Society: Spring 2012
 - Scholarship awarded by the Rochester Section of the IEEE in conjunction with the Rochester Engineering Society to students of high academic achievement who are members of a student branch of the IEEE.
- Ronald E. McNair Scholar: 2011 – 2014
 - Two year program designed to prepare minority students to apply and pursue PhD studies
- David T. Kearns Scholar: 2010 – 2014
 - Program that supports minority students pursuing baccalaureate degrees in the sciences and engineering