RACHEL WILMOTH

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EDUCATION

Ph.D. Candidate, Mechanical Engineering, PI's: Virginia Ferguson and Stephanie Bryant 2015 - Present
University of Colorado Boulder

Master of Science, Mechanical Engineering 2015-2017
University of Colorado Boulder, GPA 3.91

Bachelor of Science, Mechanical Engineering 2010-2014
Santa Clara University, GPA 3.62

MAJOR RESEARCH EXPERIENCE

University of Colorado Boulder 2016-Present
Doctoral Candidate for Professors Virginia Ferguson and Stephanie Bryant

Development of a 3D *ex vivo* Culture System to Study Osteocyte Mechanobiology

- Cultured osteocytes in degradable and 3D-printed hydrogels that promote osteocyte differentiation, bone extracellular matrix deposition, and cell connectivity.
- Loaded 3D *ex vivo* cultures in a bioreactor to mimic osteochondral strains and study the effect of frequency-induced interstitial fluid flow on osteocyte anabolic activity.
- Developing histology methods to embed, section, and stain hydrated and un-decalcified hydrogels and osteochondral tissues in glycol methacrylate.
- Conducted a 14-week mouse study using intra-articular injections to establish a mouse model of altered interstitial fluid flow in the subchondral bone plate.

Santa Clara University 2013
Undergraduate Researcher for Professor Hohyun Lee

Designed a Solar Harvesting System with Thermoelectric Modules and an Absorption Chiller Refrigerator

- Designed, prototyped, and tested the heat exchangers for transferring the heat to the absorption refrigerator.
- Wrote and used programming code to optimize the theoretical heat exchanger characteristics.

PUBLICATIONS

R. L. Wilmoth, S. J. Bryant, V. L. Ferguson, "A 3D, Dynamically Loaded Hydrogel Model of the Osteochondral Unit to Study Osteocyte Mechanobiology," *Advanced Healthcare Materials*, (2020).

A. H. Aziz,* **R. L. Wilmoth***, V. L. Ferguson, S. J. Bryant, "IDG-SW3 Osteocyte Differentiation and Bone Extracellular Matrix Deposition is Enhanced in a 3D MMP-Sensitive Hydrogel," *ACS Biomaterials,* (2020).
***Equal contributing authors**

K.M. Fischenich, J.A. Wahlquist, **R.L. Wilmoth**, L. Cai, C.P. Neu, V.L. Ferguson, Human articular cartilage is orthotropic where microstructure, micromechanics, and chemistry vary with depth and split-line orientation, *Osteoarthritis and Cartilage*, (2020).

B. Ohara, M. Wagner, C. Kunkle, P. Watson, R. Williams, R. Donohoe, K. Ugarte, **R. Wilmoth**, M. Z. Chong, and H. Lee, "Residential Solar Combined Heat and Power Generation using Solar Thermoelectric Generation," *J. Electron. Mater.*, (2015).

FUNDING

NIH T32 Fellowship: Integrative Physiology of Aging Training Grant T32AG000279-16A1 2019-Jan 2021

HONORS AND AWARDS

NIH T32 Fellowship 2019
Student Travel Achievement Recognition, Society for Biomaterials 2019
Outstanding Mechanical Engineering Research Potential Fellowship, CU Boulder 2015
NSF Graduate Research Fellowship Program Honorable Mention 2016
Fulbright Research Fellowship Alternate 2014
Honors Program, Santa Clara University 2010
Presidential Scholarship Recipient, Santa Clara University 2010

PRESENTATIONS

Oral Presentation

Biomedical Engineering Society Annual Meeting 2020
Mature Osteocyte Differentiation in a 3D MMP-Sensitive Hydrogel to Study Cell Signaling

Summer Biomechanics, Bioengineering, and Biotransport Annual Meeting 2020
PGE2-Induced Osteocyte Signaling is Mediated by 3D Culture Environments

Society for Biomaterials Annual Meeting 2019
An Osteocyte 3D Culture System to Study Osteochondral Strains and Fluid Flow in an ex vivo Model

Poster Presentation

Vail Scientific Summit Annual Meeting 2019
A 3D *Ex Vivo* Model to Study Fluid-Flow-Induced Osteocyte Signaling

Orthopedic Research Symposium Annual Meeting 2019
An Osteocyte 3D Culture System to Study Osteochondral Strains and Fluid Flow in an *ex vivo* Model

TEACHING

Graduate Teaching Assistant, University of Colorado Boulder 2015-2016
Held office hours and review sessions for Solid Mechanics (2 semesters) and Materials Science (1 semester)

High School Math and Science Tutor, Advancement via Individual Determination (AVID) 2013-2014
Tutored high school students in the AVID program in math and science

MENTORING

Undergraduate Research Opportunities, University of Colorado Boulder 2017-2018
YOU'RE@CU Program and *Discovery Learning Apprenticeship:* mentored and trained undergraduate students in lab skills, research techniques, and problem-solving strategies through semester/summer-long research projects in my lab

Girls in STEM Program, Keystone Science School, Keystone, CO 2016
Mentored K-12 girls in engineering challenges and inspired them to have the confidence to pursue STEM careers

LEADERSHIP

Co-President, GEARRS - Graduate Engineering Annual Research and Recruitment Symposium 2017-2018
Led a team of approximately 30 graduate students to execute CU Boulder's mechanical engineering three-day annual recruitment symposium

Secretary, Pi Tau Sigma Mechanical Engineering Honor Society, Santa Clara University 2012-2014
Kept minutes at all meetings, served on executive board to plan service and learning events

President, Kappa Alpha Theta Women's Fraternity, Santa Clara University 2013
Held weekly cabinet meetings, oversaw executive officers, presided at all meetings, acted as ex officio member on committees, communicated with advisors, and acted as a role model to chapter

PROFESSIONAL ASSOCIATIONS

Biomedical Engineering Society
American Medical Writers Association