

GARRETT ROELL

Personal Information

location Honolulu, HI
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EDUCATION

Ph.D., Energy, Environmental & Chemical Engineering **Washington University in St. Louis** 2017 - 2023
Advisor: Prof. Yinjie Tang
Dissertation Title: "The Development of Metabolic Models and Machine Learning Methods for Biofuel-Producing Bacteria"

B.S., Biomedical Engineering **Tufts University** 2012 - 2016
Advisor: Prof. David Kaplan
Capstone Title: "Biocompatible Conductive Hydrogels for Use in Actuators"

PRESENT POSITION

University of Hawai'i at Mānoa 2023 - Present
Assistant Professor, Department of Molecular Biosciences and Bioengineering
College of Tropical Agriculture and Human Resources

SELECTED HONORS AND AWARDS

Washington University Article on the Cover of ACS Synthetic Biology 2023
EECE Graduate Student Travel Award 2022
DOE Office of Science Graduate Student Research Award 2021
Best 'Social Programming Event' Liberman Award 2020
Bruce Rittman Graduate Fellowship

Tufts University Magna Cum Laude Honors
Dean's List All Semesters

RESEARCH EXPERIENCE

Washington University **Graduate Student Researcher** 2018 - 2023
Multi-omic analysis of aromatic tolerant biofuel producer *Rhodococcus opacus*
Machine learning and kinetic modeling of syngas-consuming *Clostridium species*
Advised by Prof. Yinjie Tang · Tang Research Group

<i>Lawrence Berkeley National Lab</i>	<p>DOE Graduate Fellow 2021 - 2022</p> <p>Development of a genome scale model for <i>R. opacus</i> Integration of transcriptomics into the genome-scale model</p> <p>Advised by Dr. Héctor García Martín · García Martín Research Group</p>
<i>Tufts University</i>	<p>Undergraduate Researcher 2015 - 2016</p> <p>Investigated the conductivity and Young's modulus of polymer doped silk gels Applied findings to optimize displacement of ionic gel actuators for soft robotics</p> <p>Advised by Prof. David Kaplan · Kaplan Research Group</p>
<i>Tufts University</i>	<p>Undergraduate Researcher 2015 - 2016</p> <p>Silk Composite RFID Biosensor for measuring blood glucose levels Evaluated the sheet resistance and resistivity of a silk-carbon nanotube composites</p> <p>Advised by Prof. Fio Omenetto · Omenetto Research Group</p>
<i>Tufts University</i>	<p>Undergraduate Researcher 2014</p> <p>Silk-Plankton Chimera Proteins for Tissue Engineering Completed plasmid construction and bacterial transformation for eight cell lines</p> <p>Advised by Prof. David Kaplan · Kaplan Research Group</p>
<i>Tufts University</i>	<p>Undergraduate Researcher 2013 - 2014</p> <p>Immunoaffinity-Based Microfluidics Device for Exosome Isolation Designed and fabricated a microfluidic device using 3D modeling to detect cancer</p> <p>Advised by Prof. Qiaobing Xu · Xu Research Group</p>
PROFESSIONAL EXPERIENCE	
<i>Washington University</i>	<p>Post-Doctoral Researcher 2023 - present</p> <p>Multi-omic analysis of aromatic tolerant biofuel producer <i>Rhodococcus opacus</i> Machine learning and kinetic modeling of syngas-consuming <i>Clostridium species</i></p> <p>Advised by Prof. Yinjie Tang · Tang Research Group</p>
<i>Genesys Diagnostic Inc</i>	<p>Lab Technician Intern 2013</p> <p>Prepared cell lines for karyotyping by fixing samples on microscope slides Performed Fluorescence In Situ Hybridization (FISH) on cell lines</p> <p>East Lyme, CT · Genesys Diagnostic Inc</p>
<i>Inspirica Tutors</i>	<p>Professional Tutor 2016 - 2017</p> <p>Tutored over 30 students for SAT, ACT, and SSAT Newton Center, MA</p>

PUBLICATIONS

- (6) **GW Roell**, C Schenk, ..., YJ Tang, HG Martin. A high-quality genome-scale model for *Rhodococcus opacus* metabolism. ACS Synthetic Biology. Accepted.
- (5) Z Xiao, W Li, ..., **GW Roell***, Y Chen*, YJ Tang*. Generative artificial intelligence GPT-4 accelerates knowledge mining and machine learning for synthetic biology. In prep. * = corresponding author
- (4) **GW Roell**, Z Xiao, JJ Czajka, Y Chen, YJ Tang. IMPACT: The Industrial Microbiology Publication and AI Crowdsourced Toolbox. In prep.
- (3) **GW Roell**, A Sathish, N Wan, ..., YJ Tang, FS Bao. A comparative evaluation of machine learning algorithms for predicting syngas fermentation outcomes. Biochemical Engineering Journal. 186 (2022)
- (2) **GW Roell**, RR Carr, ..., M Foston, G Dantas, TS Moon, YJ Tang. A concerted systems biology analysis of phenol metabolism in *Rhodococcus opacus* PD630. Metabolic Engineering, 55 (2019), pp. 120-130
- (1) **GW Roell**, J Zha, RR Carr, MAG Koffas, SS Fong, YJ Tang. Engineering microbial consortia by division of labor. Microbial Cell Factories. 18 (2019), pp. 1-11

INVITED TALKS

- (4) AIChE Annual Meeting, Fall 2022, Phoenix, AZ, November 2022, "A High-Quality Genome-Scale Model for *Rhodococcus opacus* Metabolism."
- (3) AIChE Annual Meeting, Fall 2022, Phoenix, AZ, November 2022, "A comparative evaluation of machine learning algorithms for predicting syngas fermentation outcomes."
- (2) Genomic Sciences Program Annual PI Meeting, Winter 2019, Tyson Corner, VA, February 2020, "Characterizing growth and metabolism of *Rhodococcus* PD630 on real lignin breakdown products."
- (1) Genomic Sciences Program Annual PI Meeting, Winter 2019, Tyson Corner, VA, February 2019, "A Concerted Systems Biology Analysis of Aromatic Metabolism in *Rhodococcus opacus* PD630."

CONTRIBUTED PRESENTATIONS

- (5) Genomic Sciences Program Annual PI Meeting, Winter 2019, Tyson Corner, VA, February 2019, "Systems Engineering of *Rhodococcus opacus* to Enable Production of Drop-in Fuels from Lignocellulose."
- (4) Society for Industrial Microbiology and Biotechnology Annual Meeting, Summer 2021, Austin, TX, August 2021, "Elucidating aromatic utilization mechanisms in engineered *Rhodococcus opacus* strains for lignin valorization."
- (3) Genomic Sciences Program Annual PI Meeting, Winter 2019, Tyson Corner, VA, February 2021, "Elucidating Aromatic Utilization Mechanisms in Engineered *Rhodococcus opacus* Strains for Lignin Valorization."
- (2) Genomic Sciences Program Annual PI Meeting, Winter 2019, Tyson Corner, VA, February 2020, "Expression of Beta-Ketoadipate and Aromatic gene clusters in *R. opacus* strains adapted to growth on model lignin breakdown products."
- (1) Genomic Sciences Program Annual PI Meeting, Winter 2019, Tyson Corner, VA, February 2019, "Exploring the Hybrid Conversion of Lignin into Biodiesel."

TEACHING EXPERIENCE

Washington University **Assistant to Instructor** *Spring 2020*
EECE 534: Environmental Nanochemistry
Instructor: Prof. Young-Shin Jun

Washington University **Assistant to Instructor** *Spring 2019*
EECE 506 Bioprocess Engineering I: Fundamentals & Applications
Instructor: Prof. Yinjie Tang

Washington University **Assistant to Instructor** *Fall 2018*
EECE 101 Introduction to Energy, Environmental and Chemical Engineering
Instructor: Prof. Dan Giammar

STUDENTS SUPERVISED

Washington University
Hannah Moon, High School Student (2022-present)
Dahlia Abdulsattar, Undergraduate Student (2019-2021)
Duo Zhang, Master's Student (2019-2021)
Osheen Dabas, Master's Student (2020-2020)
Chun -Yu Choi, Master's Student (2019-2019)

OTHER INFORMATION

Metrics Citations: 224

Service
President of the Association of Graduate Engineering Students (2020)
Vice President of the Association of Graduate Engineering Students (2020)
Chief Executive Officer of ImpactDB LLC
Chief Technology Officer and Co-Founder of All Things Analysis LLC
EECE Faculty Search Student Committee Spokesman (2019)
Social Coordinator of Association of Graduate Engineering Students (2018 - 2019)
Tufts Emergency Medical Service (2013 - 2014)
Eagle Scout (2012)

Programming Languages and Libraries
Python: Pandas, scikitLearn, PyMC3, COBRAPy, Django
JavaScript: React, Node.js, Vanilla JS, ChakraUI

Interests football · pickleball · volleyball · travel

September 6, 2023