

**Garrett Roell**  
 College of Tropical Agriculture and Human Resources  
 Department of Molecular Biosciences & Bioengineering (MBBE)  
 FTE Distribution: 40% I; 60% R; 0% E

**Education**

<u>Degree</u>	<u>University</u>	<u>Major</u>
BS (2016)	Tufts University, Medford, MA	Biomedical Engineering
PhD (2023)	Washington University in St. Louis, St. Louis MO	Chemical Engineering

**Professional Appointments**

<u>Title</u>	<u>Employer</u>	<u>Dates Employed</u>
Assistant Professor	University of Hawai‘i at Mānoa	2023-Present
Post-Doctoral Researcher	Washington University	2023

**Courses Taught**

<u>Number</u>	<u>Name</u>	<u>Credits</u>
BE 437	Biosystems Unit Operations	3 credits
BE 447	AI for Bioprocesses	3 credits
BE 491	AI for Bioprocesses - Special Topics	3 credits
MBBE 610	Molecular Biosciences Seminar	1 credit

**Publications (reverse chronological order; \* = Corresponding author)**

1. AM Worland, Z Han, J Maruwan, Y Wang, ZY Du, YJ Tang, WW Su\*, **GW Roell\***. 2024. Elucidation of triacylglycerol catabolism in *Yarrowia lipolytica*: How cells balance acetyl-CoA and excess reducing equivalents. *Metabolic Engineering*, 85, 1-13.
2. Z Xiao, W Li, H Moon, **GW Roell\***, Y Chen\*, YJ Tang\*. 2023. Generative artificial intelligence GPT-4 accelerates knowledge mining and machine learning for synthetic biology. *ACS Synthetic Biology*, 12, 10, 2973–2982.
3. **GW Roell**, C Schenk, WE Anthony, RR Carr, A Ponukumati, J Kim, E Akhmatskaya, M Foston, G Dantas, TS Moon, YJ Tang, HG Martin. 2023. A high-quality genome-scale model for *Rhodococcus opacus* metabolism. *ACS Synthetic Biology*, 12, 6, 1632–1644.
4. **GW Roell**, A Sathish, N Wan, Q Cheng, Z Wen, YJ Tang, FS Bao. 2022. A comparative evaluation of machine learning algorithms for predicting syngas fermentation outcomes. *Biochemical Engineering Journal*, 186.
5. **GW Roell**, RR Carr, T Campbell, Z Shang, WR Henson, JJ Czajka, HG Martín, F Zhang, M Foston, G Dantas, TS Moon, YJ Tang. 2019. A concerted systems biology analysis of phenol metabolism in *Rhodococcus opacus* PD630. *Metabolic Engineering*, 55, 120-130
6. **GW Roell**, J Zha, RR Carr, MAG Koffas, SS Fong, YJ Tang. 2019. Engineering microbial consortia by division of labor. *Microbial Cell Factories*. 18, 1–11

**Creative Works (i.e., Extension Videos, Websites, Blogs, Creative Designs and Exhibitions, etc.)**

ImpactDB ([impact-database.com](https://impact-database.com)): The Industrial Microbiology Publication and AI Crowd-sourced Toolbox (ImpactDB) is a platform for facilitating collaboration among synthetic biology researchers. This database exists to centralize the currently distributed efforts of researchers who extract data from academic papers. ImpactDB

also contains web interfaces for open-sourced machine learning models for titer prediction and strain design. These user-friendly interfaces provide access to modern computational biology tools.

Metabolomics Visualization Website ([metabolomics.garrettroell.com](http://metabolomics.garrettroell.com))

Roell Lab Website ([lab.garrettroell.com](http://lab.garrettroell.com))

Personal Website ([garrettroell.com](http://garrettroell.com))

### Leadership Roles (Committees, Boards, Advisory, etc.)

Spring 2025	MBBE Curriculum Committee
Spring 2025	Bioengineering Curriculum Committee
Fall 2023, Spring 2025	MBBE Admissions Committee
2020-2021	President of the Association of Graduate Engineering Students (AGES)
2019	EECE Faculty Search Student Committee Spokesman

### Graduate Students

<u>Category</u>	<u>Current Number of Students</u>	<u>Number Graduated (Career)</u>
Chair of Master's Committees	1	0
Member of Master's Committees	3	3

### Grant Support

Title of Grant: Converting organic wastes to sustainable aviation fuel precursors by integrating anaerobic digestion and machine-learning enhanced yeast cell factory  
Source of Grant: USDA (Sun Grant Western Region)  
Total Dollar Value: \$131,904 (\$52,904)  
Dates of Grant: 2024-2025  
Role: Co-PI

### Presentations at Conferences

Title: Combining  $^{13}\text{C}$ -MFA, Genome-Scale Modeling, and Transcriptomics to Understand How *Yarrowia lipolytica* Consumes Lipids  
Authors: [Your Name and any co-authors, if applicable]  
Name of Conference: International SynBYSS Conference  
Location: Honolulu, HI  
Date of Presentation: December 2024

Title: Understanding *Yarrowia lipolytica* Triacylglycerol Catabolism Using  $^{13}\text{C}$ -Metabolic Flux Analysis, Genome-Scale Modeling, and Transcriptomic Analysis  
Authors: AM Worland, Z Han, J Maruwan, Y Wang, ZY Du, YJ Tang, WW Su, **GW Roell**  
Name of Conference: AIChE Annual Meeting  
Location: San Diego, CA  
Date of Presentation: November 2024

Title: Integrating Omics Data and Metabolic Models for Bioprocess Optimization  
Authors: **GW Roell**  
Name of Conference: INBRE Western States RAIN Collaboration Studio  
Location: Laramie, WY  
Date of Presentation: May, 29 2024

Title: Machine Learning and Metabolic Models for Bioprocess Optimization  
Authors: **GW Roell**

Name of Conference: AI-ENGAGE  
Location: Singapore  
Date of Presentation: February, 14 2024

Title: A High-Quality Genome-Scale Model for *Rhodococcus opacus* Metabolism  
Authors: **GW Roell**, C Schenk, WE Anthony, RR Carr, A Ponukumati, J Kim, E Akhmatskaya, M Foston, G Dantas, TS Moon, YJ Tang, HG Martin  
Name of Conference: 2022 Annual Meeting of the American Institute of Chemical Engineers (AIChE)  
Location: Phoenix, AZ  
Date of Presentation: November 17, 2022

Title: A Comparative Evaluation of Machine Learning Algorithms for Predicting Syngas Fermentation Outcomes  
Authors: **GW Roell**, A Sathish, N Wan, Q Cheng, Z Wen, YJ Tang, FS Bao  
Name of Conference: 2022 Annual Meeting of the American Institute of Chemical Engineers (AIChE)  
Location: Phoenix, AZ  
Date of Presentation: November 15, 2022

Title: Elucidating Aromatic Utilization Mechanisms in Engineered *Rhodococcus opacus* Strains for Lignin Valorization  
Authors: W Anthony, RR Carr, J Diao, GW Roell, A Ponukumati, Y Hu, B Wang, J Ning, K Davis, D DeLorenzo, HG Martin, Y Tang, **M Foston**, F Zhang, TS Moon, G Dantas  
Name of Conference: 2021 Society for Industrial Microbiology and Biotechnology Annual Meeting  
Location: Austin, TX  
Date of Presentation: August 8, 2021

Title: Elucidating Aromatic Utilization Mechanisms in Engineered *Rhodococcus opacus* Strains for Lignin Valorization  
Authors: **W Anthony**, RR Carr, J Diao, GW Roell, A Ponukumati, Y Hu, B Wang, J Ning, K Davis, D DeLorenzo, HG Martin, Y Tang, M Foston, F Zhang, TS Moon, G Dantas  
Name of Conference: 2021 Department of Energy (DOE) Genomic Sciences Program (GSP) Annual PI Meeting  
Location: Tyson Corner, VA  
Date of Presentation: February 24, 2021

Title: Characterizing Growth and Metabolism of *Rhodococcus* PD630 on Real Lignin Breakdown Products  
Authors: **GW Roell**, RR Carr, A Krishnamurthy, Z Shang, YM Kim, G Dantas, M Foston, TS Moon, and Y Tang  
Name of Conference: 2020 Department of Energy (DOE) Genomic Sciences Program (GSP) Annual PI Meeting  
Location: Tyson Corner, VA  
Date of Presentation: February 18, 2020

Title: Expression of Beta-Ketoadipate and Aromatic gene clusters in *R. opacus* strains adapted to growth on model lignin breakdown products  
Authors: **W Anthony**, RR Carr, J Diao, GW Roell, A Ponukumati, Y Hu, B Wang, J Ning, K Davis, D DeLorenzo, HG Martin, Y Tang, M Foston, F Zhang, TS Moon, G Dantas  
Name of Conference: 2020 Department of Energy (DOE) Genomic Sciences Program (GSP) Annual PI Meeting  
Location: Tyson Corner, VA  
Date of Presentation: February 18, 2020

Title: Systems Engineering of *Rhodococcus opacus* to Enable Production of Drop-in Fuels from Lignocellulose  
Authors: T Campbell, GW Roell, RR Carr, Z Shang, WR Henson, JJ Czajka, HG Martín, F Zhang, M Foston, TS Moon, YJ Tang, **G Dantas**  
Name of Conference: 2019 Department of Energy (DOE) Genomic Sciences Program (GSP) Annual PI Meeting  
Location: Tyson Corner, VA  
Date of Presentation: February 26, 2019

Title: Exploring the Hybrid Conversion of Lignin into Biodiesel  
Authors: **Z Shang**, RR Carr, M Walker, G Roell, TS Moon, Y Tang, B Williams, F Zhang, G Dantas, HG Martin,

M Foston

Name of Conference: 2019 Department of Energy (DOE) Genomic Sciences Program (GSP) Annual PI Meeting

Location: Tyson Corner, VA

Date of Presentation: February 26, 2019

Title: A Concerted Systems Biology Analysis of Aromatic Metabolism in *Rhodococcus opacus* PD630

Authors: **GW Roell**, RR Carr, T Campbell, Z Shang, WR Henson, JJ Czajka, HG Martín, F Zhang, M Foston, G Dantas, TS Moon, YJ Tang

Name of Conference: 2019 Department of Energy (DOE) Genomic Sciences Program (GSP) Annual PI Meeting

Location: Tyson Corner, VA

Date of Presentation: February 25, 2019