Emily Rhodes

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Education

Ph.D. In Biological Engineering   August 2020 – Present

Advisor: Dr. Kayla Sprenger, GPA: 3.845, University of Colorado, *Boulder*, CO

M.Sc. in Biomedical Engineering   August. 2020 – May 2023

Advisors: Dr. Kayla Sprenger and Tim Whitehead, GPA: 3.845, University of Colorado, *Boulder*, CO

B.S. in Chemical Engineering, University of Washington, *Seattle*, WA   Sept. 2016 – June 2020

University of Washington, *Seattle*, WA, GPA: 3.68

Awards & Honors

- Catalyzing Gender Equity at Schrödinger   May 2023
- Graduate and Postdoctoral Women's Fellowship at D. E. Shaw Research   May 2023
- Graduate Assistance in Areas of National Need (GAANN)   Aug. 2021 – May. 2023
- CU Venture Challenge: Idea Builder Award Recipient   Oct. 19th, 2022
- FOMMS Early Career Researcher Award – NSF   July 21st, 2022
- FOMMS Best Poster Award   July 21st, 2022
- The Colorado Senate: Congratulations and Commendations for Research   August 24th, 2021
- Office of the CU Boulder President: Thank You for Research   August 25th, 2021
- Women in Chemical Engineering Travel Award   Oct. 2021 – Nov. 2021
- Graduate and Professional Student Government Travel Award   Sept. 2021 – Nov. 2021

Software Experience:

Python, GROMACS, Gaussian, MatLab, HDock, ClusPro, WebSDA, AutoDock, PremPS, ABangle

Research Experience

Graduate Research at Sprenger Lab, CU Boulder   Aug. 2020 – Present

Project Title: Cytokine Stabilization

   Compute denaturation indicators within molecular dynamics simulations to uncover crucial system properties for cytokine stabilization within drug delivery systems

Project Title: HL Antibody Interface Angle

   Propose and validate molecular mechanisms impacting antibody interface angles and protein dynamics as a result of framework mutations using quantitative techniques

Project Title: SARS-CoV-2 Antibody Escape Mechanisms

   Harness molecular dynamic simulations to illuminate mechanistic features of RBD escape

Project Title: Framework Mutation Mechanisms

   Quantify the impact of framework mutations that frequently were found in a sample population of adults on stability of the antibodies

Graduate Research at Whitehead Lab, CU Boulder   Dec. 2020 – Oct. 2022

Project Title: Anchor Epitope Antibody Sequence Determinants

   Explore the mutational landscape for anchor epitope antibodies targeting hemagglutinin and determine the evolutionary pathway for development of broadly neutralizing influenza antibodies

Project Title: Neutralization Threshold for Antibody Binding

   Investigate the neutralization threshold of antibodies below a concentration of 0.001 µg/mL using a model of the kinetics of binding

Research Assistant at Pfaendtner Research Group, UW Seattle   Dec. 2018 – June 2020

   Investigated the interactions between β-amyloid peptides and ionic liquids to determine what environmental factors inhibit β-sheet aggregation and formation of pre-fibrils

Research Assistant at Nance Lab, UW Seattle   Sept. 2017 – Dec. 2018

   Illuminated the effects of perineuronal nets on nanoparticle diffusion and designed, conducted, and analyzed experiments about the properties of nanoparticles within the brain

Young Scholars Summer Research Program at CU Boulder   June 2018 – Aug. 2018

   Experimentally analyzed the function of the Notch – 1 pathway in muscle stem cells and used MATLAB scripts to quantify results and determine the impact of Notch – 1 on tubular cells

Co-Founder of Pallicera LLC   Nov. 2019 – Nov. 2020
  Designed, tested, and iterated on taste-masking formulations for medications using novel solvents while excelling and progressing rapidly in the startup community as assessed by a team of 7 mentors in the Jones + Foster Accelerator Program

Papers

Emily R. Rhodes, Nicole B. Day, Emma C. Aldrich, C. Wyatt Shields IV, Kayla G. Sprenger, 2023, Mechanism of cytokine stabilization by bovine serum albumin, In Preparation.

Emily R. Rhodes, Jon Faris, Brian Petersen, Kayla G. Sprenger, 2023, Common framework mutations impact antibody interfacial dynamics and flexibility, *Frontiers in Immunology* 14, 1120582 (2023).

Brian Petersen, Sophia A. Ulmer, *Emily R. Rhodes*, Matias Gutiérrez-González, Brandon DeKosky, Kayla G. Sprenger and Timothy A. Whitehead, 2021, Regulatory approved monoclonal antibodies contain framework mutations predicted from human antibody repertoires, *Frontiers in Immunology* 12, 728694 (2021).

Irene Francino Urdaniz, Paul J. Steiner, Monica B. Kirby, Fangzhu Zhao, Cyrus M. Haas, Shawn Barman, *Emily R. Rhodes*, Linghang Peng, Kayla G. Sprenger, Joseph G. Jardine, Timothy A. Whitehead, 2021, One-shot identification of SARS-CoV-2 S RBD escape mutants using yeast screening, *Cell Rep.* 36, 109627 (2021).

Presentations & Press

Emily R. Rhodes, Nicole Day, Wyatt Shields and Kayla Sprenger, Kill Them with "Kine"Ness: Using MD Simulations to Guide the Design of Cytokine Drug Delivery Platforms for Cancer Therapy, *Poster Presentation*, Foundations of Molecular Modeling and Simulation (FOMMS) (2022)

Darius Johnson, August 13th, 2021, CU Boulder researchers tracking virus mutations before they can become variants, *9news* (Featured in article)

Emily R. Rhodes, Tim Whitehead, Kayla Sprenger, RBD Escape Mutations Span Multiple Antibodies, *Oral Presentation*, American Institute of Chemical Engineers (AIChE) (2021)

Emily R. Rhodes, Tim Whitehead, Kayla Sprenger, Mathematical Modeling of the Observed Neutralization Threshold of Antibodies against SARS-CoV-2, *Poster Presentation*, AIChE (2021)

Emily R. Rhodes, Sarah Alamdari, Jim Pfaendtner, Applications of Synthetic and Natural Cannabinoids on Beta-Amyloid Peptide Aggregation, *Oral Presentation*, AIChE (Nov. 11th, 2019)

Emily R. Rhodes, Sarah Alamdari, Jim Pfaendtner, Applications of Synthetic and Natural Cannabinoids on Beta-Amyloid Peptide Aggregation, *Oral Presentation*, Undergraduate Research Symposium at the University of Washington (May 15th, 2020)

Teaching Experience

Research Mentor: Sprenger Lab   Dec. 2021 – Present
  Advise and guide research for students through goal setting, regular check-ins, and research meetings

"Pharmaceutical Biotechnology" CHEN 4801 Teaching Assistant   Aug. 2022 – Dec 2023
  Taught 4 lectures in the Chemical and Biological Engineering Department on various aspects of drug development and delivery while assessing learning with weekly quizzes and homework assignments

GAANN Tutoring   Dec. 2021 – May 2022
  Taught and mentored students studying Biokinetics at the University of Colorado, Boulder

"Chemistry for Engineers" CHEN 1211 Teaching Assistant   Sept. 2020 – Dec 2020
  Taught weekly recitation for a class of future engineers and organized weekly meetings with fellow TAs to prepare worksheets for students