

Judith R. Cristobal, PhD

judithcr@buffalo.edu

EDUCATION

University at Buffalo – Buffalo, New York **2021-2023**
Post-Doctoral Research Associate

University at Buffalo - Buffalo, New York
PhD Medicinal Chemistry **2016-2021**

- Dissertation Title: The Mechanism of Action of Glycerol-3-phosphate Dehydrogenase and Orotidine 5'-Monophosphate Decarboxylase: Insights from Studies of Enzyme Variants

UB Cumulative GPA: 3.89

Runner-up: Best Thesis Award 2021

University of the Philippines Los Baños - Laguna, Philippines **2011-2016**
MS Chemistry, Minor in Biochemistry

(TRANSFERRED TO UB TO COMPLETE PHD - UNITS EARNED: 24)

University of the Philippines Los Baños - Laguna, Philippines
BS Chemistry **2005 - 2009**

- Thesis Title: Optimization of the concentrations of 3-aminopropyltriethoxysilane and glutaraldehyde for the immobilization of papain on white lahar (*Volcanic ejecta*)

WORK AND RESEARCH EXPERIENCE

University at Buffalo – Buffalo, NY **March 2025 – present**
Senior Research Scientist/RENEW Research Laboratories Director

Research interests focus on identifying and quantifying contaminants and emerging chemicals in complex environmental samples. Key areas include the fate and transport of pollutants, developing analytical methods, and understanding accumulation mechanisms. The research also explores the toxicological effects of PFAS (per- and polyfluoroalkyl substances) and utilizes advanced analytical chemistry techniques for pollutant analysis.

Duties at the RENEW institute include leading training sessions, ensuring safety compliance, managing shared instrumentation and lab facilities, overseeing interdisciplinary projects, mentoring students, preparing data for reports, onboarding visiting researchers, handling daily lab operations in Dr. Diana Aga's lab, supporting research proposals, and guiding students in preparing research papers for publication.

University at Buffalo - Buffalo, New York **April 2023 – March 2025**
Senior Research Scientist

Research focused on detecting and quantifying pharmaceutical and personal care products (PPCPs) as contributors to antimicrobial resistance (AMR) in municipal wastewater treatment plants. Additional studies include the investigation of the neurotoxic effects of PFAS on differentiated neuroblastoma cells through transcriptomics and lipidomics, as well as the role of cellular transporters in PFAS uptake. Contributed to environmental initiatives funded by NIH and EPA grants. Directed multiple departmental projects, ensuring timely completion and alignment with organizational goals. The position required management of graduate and undergraduate researchers, as well as management of external grants from the NIH and EPA.

University at Buffalo - Buffalo, New York **October 2021 – April 2023**
Postdoctoral Research Associate

Research focused on elucidating the mechanisms of enzyme-catalyzed reactions and the behavior of small molecules in solutions, aiming to enhance our understanding of enzyme catalysis. Investigated the impact of various molecular fragments on enzyme activation and activity, with a specific emphasis on the interactions between NAD cofactor fragments and enzymes that stabilize transition states. The role involved managing and mentoring graduate and undergraduate research associates, providing comprehensive guidance and support for their academic and professional growth. Additionally, oversaw the calibration and maintenance of laboratory equipment to ensure precise and reliable experimental outcomes.

University at Buffalo - Buffalo, New York

June 2018 – October 2021

Research Project Assistant

Research focused on in-depth mechanistic studies of enzyme-catalyzed decarboxylation and hydride transfer reactions, with a particular emphasis on stabilizing interactions between enzymes and substrates. Analyzed factors affecting catalytic efficiency by pinpointing critical molecular interactions that enhance enzymatic functionality. Purified and characterized proteins, designed and executed rigorous experiments, analyzed and interpreted data, and prepared findings for publication in chemical literature. Presented results at multiple academic conferences.

University at Buffalo - Buffalo, New York

August 2016 – May 2018

Graduate Teaching Assistant

Delivered hands-on laboratory instruction and guidance for undergraduate students in General Chemistry courses (CHE102 & CHE 201).

University of the Philippines - Los Baños, Laguna, Philippines

July 2009 – June 2016

Instructor

Instructed all level laboratory courses for Chemistry (General Chemistry, Organic, and Analytical) major and non-major undergraduate students.

TEACHING EXPERIENCE

University at Buffalo - Buffalo, New York

August 2016 – May 2018

Graduate Teaching Assistant

Delivered hands-on laboratory instruction and guidance for undergraduate students in General Chemistry courses (CHE102 & CHE 201).

University of the Philippines - Los Baños, Laguna, Philippines

July 2009 – June 2016

Instructor

Instructed all level laboratory courses for Chemistry (General Chemistry, Organic, and Analytical) major and non-major undergraduate students.

PUBLICATIONS

Jenise Z. Paddayuman, **Judith R. Cristobal**, Luane J. B. Landau, Ashleigh L. Gagnon, Omer Gokcumen, Diana S. Aga, G. Ekin Atilla-Gokcumen. Chronic exposure to PFAS triggers systems-level cellular reprogramming independent of their bioaccumulation. *bioRxiv*. **2025**. <https://doi.org/10.1101/2025.07.03.662990>. (shared first author)

Sheena Conforti, Amy Pruden, Nicole Acosta, Christopher Anderson, Helmut Buergermann, Juliana Calabria De Araujo, **Judith R. Cristobal**, Barbara Drigo, Claire Ellison, Zanah Francis, Dominic Frigon, Markus Gaenzle, Julia Vierheilg, Timothy R. Julian, Uli Klümper, Liping Ma, Chand Mangat, Maya Nadimpalli, Manami Nakashita, Gilbert Osen, Sasikaladevi Rathinavelu, Richard Reid-Smith, Michael Saldana, Heike Schmitt, Shuxian Li, Andrew C. Singer, Tam T. Tran, Kadir Yanac, Gustavo Ybazeta, Monika Harnisz. Strengthening Policy Relevance of Wastewater-Based Surveillance for Antimicrobial Resistance. *Environ. Sci. Technol.* **2025**, 59, 5, 2339–2343. <https://doi.org/10.1021/acs.est.4c09663>

Logan Running, **Judith R. Cristobal**, Charikleia Karageorgiou, Michelle Camdzic, John Michael N. Aguilar, Omer Gokcumen, Diana S. Aga and G. Ekin Atilla-Gokcumen. Investigating the Mechanism of Neurotoxic Effects of PFAS in Differentiated Neuronal Cells through Transcriptomics and Lipidomics Analysis. *ACS Chem. Neurosci.* **2024**, 15, 24, 4568–4579. <https://doi.org/10.1021/acscemneuro.4c00652>. (shared first author)

Karla M. Rios-Bonilla, Diana S. Aga, Jungeun Lee, Maria Konig, Weiping Qin, **Judith R. Cristobal**, Gunes Ekin Atilla-Gokcumen, and Beate I. Esher. Neurotoxic Effects of Mixtures of Perfluoroalkyl Substances (PFAS) at Environmental and Human Blood Concentrations. *Environ. Sci. Technol.* **2024**, 58(38):16774-16784. <https://doi.org/10.1021/acs.est.4c06017>

Rania Hegazy, **Judith R. Cristobal**, and John P. Richard. Glycerol 3-Phosphate Dehydrogenase Catalyzed Hydride Transfer: Enzyme Activation by Cofactor Pieces. *Biochemistry.* **2024**, 63(21), 2878-2891. <https://doi.org/10.1021/acs.biochem.4c00324>

Judith R. Cristobal, Rania Hegazy, John P. Richard. Glycerol-3-phosphate dehydrogenase: Role of the Protein Conformational Change in Activation of a Readily Reversible Enzyme-Catalyzed Hydride Transfer Reaction. *Biochemistry.* **2024**, 63 (8), 1016-1025. <https://doi.org/10.1021/acs.biochem.3c00702>

Judith R. Cristobal and John P. Richard. Chapter Four- Kinetics and mechanism for enzyme-catalyzed reactions of substrate pieces. *Methods in Enzymol.* **2023**, 685, 95-126. <https://doi.org/10.1016/bs.mie.2023.03.002>

Judith R. Cristobal, Richard W. Nagorski, John P. Richard. Utilization of Cofactor Binding Energy for Enzyme Catalysis: Formate Dehydrogenase-Catalyzed Reactions of the Whole NAD Cofactor and Cofactor Pieces. *Biochemistry.* **2023**, 62, 15, 2314-2324. <https://doi.org/10.1021/acs.biochem.3c00290>

Judith R. Cristobal and John P. Richard. Glycerol-3-phosphate Dehydrogenase: The K120 and K204 Side Chains Define an Oxyanion Hole at the Enzyme Active Site. *Biochemistry.* **2022**, 61, 10, 856-867. <https://doi.org/10.1021/acs.biochem.2c00053>

John P. Richard, **Judith R. Cristobal**, and Tina L. Amyes. Linear Free Energy Relationships for Enzymatic Reactions: Fresh Insight from a Venerable Probe. *Acc. Chem. Res.* **2021**, 54 (10), 2532-2542. <https://doi.org/10.1021/acs.accounts.1c00147>

Patrick L. Fernandez, Richard W. Nagorski, **Judith R. Cristobal**, Tina L. Amyes, and John P. Richard. Phosphodianion Activation of Enzymes for Catalysis of Central Metabolic Reactions. *J. Am. Chem. Soc.* **2021**, 143(7), 2694-2698. <https://doi.org/10.1021/jacs.0c13423>

Judith R. Cristobal, Tiago A. S. Brandao, Archie C. Reyes, and John P. Richard. Protein-Ribofuranosyl Interactions Activate Orotidine-5'-Monophosphate Decarboxylase for Catalysis. *Biochemistry.* **2021**, 60 (45), 3362-3373. <https://doi.org/10.1021/acs.biochem.1c00589>

Anil R. Mhashal, Adrian Romero-Rivera, Lisa S. Mydy, Judith R. Cristobal, Andrew M. Gulick, John P. Richard and Shina C. L. Kamerlin. Modeling the Role of a Flexible Loop and Active Site Side Chains in Hydride Transfer Catalyzed by Glycerol-3-phosphate Dehydrogenase. *ACS Catal.* **2020**, 10(19), 11253-11267. <https://doi.org/10.1021/acscatal.0c0757>

Judith R. Cristobal, Archie C. Reyes, and John P. Richard. The Organization of Active Site Side Chains of Glycerol-3-Phosphate Dehydrogenase Promotes Efficient Enzyme Catalysis and Rescue of Variant Enzymes. *Biochemistry.* **2020**, 59(16), 1582-1591. <https://doi.org/10.1021/acs.biochem.0c00175>

Rui He, **Judith R. Cristobal**, Naiji Jabin Gong, and John P. Richard. Hydride Transfer Catalyzed by Glycerol Phosphate Dehydrogenase: Recruitment of an Acidic Amino Acid Side Chain to Rescue a Damaged Enzyme. *Biochemistry.* **2020**, 59(51), 4856-4863. <https://doi.org/10.1021/acs.biochem.0c00801>

Lisa S. Mydy, **Judith R. Cristobal**, Roberto D. Katigbak, Paul Bauer, Archie C. Reyes, Shina Caroline Lynn Kamerlin, John P. Richard, and Andrew M. Gulick. Human Glycerol 3-Phosphate Dehydrogenase: X-ray Crystal Structures That Guide the Interpretation of Mutagenesis Studies. *Biochemistry.* **2019**, 58(8), 1061-1073. <https://doi.org/10.1021/acs.biochem.8b01103>. (shared first author)

Under Review:

Jenise Z. Paddayuman, **Judith R. Cristobal**, Luane J. B. Landau, Ashleigh L. Gagnon, Omer Gokcumen, Diana S. Aga, G. Ekin Atilla-Gokcumen. Chronic exposure to PFAS triggers Cellular Oxidative Stress and Alters Lipid Levels as Revealed through Multi-Omics Analysis. *Environ. Sci. Technol.* 2025.

In preparation:

Liezel Mari Abaya, Shafayat Ahmed, Erin Wienke, Alyssa Warrior, Shannon Seneca, Liqing Zhang, **Judith R. Cristobal**, and Diana S. Aga. Co-Occurrence and Persistence of Antidepressants and Illicit Drug Residues in Wastewater Treatment Plants. Target Journal: Discover Water

Preeyaporn Phosiri, Joshua S. Wallace, **Judith R. Cristobal**, Thushara Tennakoon, Rodjana Burakham, and Diana S. Aga. To Automate or Not to Automate: Optimizing Parameters in Liquid Chromatography-Triple Quadrupole Mass Spectrometry for Antibiotics and Pesticides. Target Journal: Analytical Methods

ORAL AND POSTER PRESENTATIONS

Oral Presentations:

ACS Spring 2025. Title: Investigating the Mechanism of Neurotoxic Effects of PFAS in Differentiated Neuronal Cells through Transcriptomics and Lipidomics Analysis. San Diego, CA, USA.

38th Graduate Student Symposium (GSS) 2018. Title: Crystallization Studies on Human Glycerol-3-phosphate dehydrogenase. Buffalo, NY, USA.

Poster Presentations

ASBMB (American Society for Biochemistry and Molecular Biology) 2023. Title: Utilization of the NAD Binding Energy for Stabilization of Transition States for Enzyme-Catalyzed Hydride Transfer Reactions. *Seattle, WA, USA.*

ACS Spring 2021. Title: Human Glycerol-3-phosphate Dehydrogenase: Effect of Polyhistidine Tag on Enzyme Function and Activity. *Virtual Meeting.*

ACS Fall 2020. Title: Organization of active site side chains at Glycerol-3-Phosphate dehydrogenase promotes efficient catalysis and rescue of variant enzymes. *Virtual Meeting.*

26th Enzyme Mechanisms Conference (EMC). 2019. Title: Human Glycerol-3-Phosphate Dehydrogenase: X-ray Crystal Structures that Guide Interpretation of Mutagenesis Studies. *New Orleans, LA, USA.*

47th Physical Organic Minisymposium (POMS). Title: Glycerol-3-Phosphate Dehydrogenase: Interactions between Substrate and Activators with K120, R269, and Q295 Side Chains. *York University, Toronto, CA*

ACS Fall 2019. Title: Activation of Orotidine 5'-Monophosphate Decarboxylase by Interactions between Substrate or Activator Ribosyl Hydroxyls and the Side Chains of Asp37 and Thr100'. *San Diego, CA*

AWARDS AND FEATURES

Undergraduate Poster Competition Judge: American Society for Biochemistry and Molecular Biology (ASBMB) **2023.** *Seattle, WA, USA*

Visitor of the Week: Cold Spring Harbor Laboratory (CSHL) Meetings and Courses, April **2022.**

Visitor of the Week: Judith Cristobal — Current Exchange. *Cold Spring Harbor, NY, USA*

Runner-up. Best Thesis Award. **2021.** Dissertation Title: The Mechanism of Action of Glycerol-3-phosphate Dehydrogenase and Orotidine 5'-Monophosphate Decarboxylase: Insights from Studies of Enzyme Variants. Advisor: Dr. John P. Richard. *Buffalo, NY, USA*

TRAINING

Cold Spring Harbor Laboratory (CSHL) Meetings and Courses Program. **2022.** Expression, Purification, and Analysis of Proteins and Protein Complexes. Cold Spring Harbor, NY, USA

Structural Biology Workshop. **2018.** Hauptman-Woodward Research Institute (HWI). Buffalo, NY

Cold Spring Harbor Laboratory (CSHL) Meetings and Courses Program. **2017.** Macromolecular Crystallography. Cold Spring Harbor, NY, USA

STUDENT MENTEES

Liesel Mari Abaya (3rd year PhD Student)

Ann Elizabeth Enova (1st year PhD Student)

Tyrone Enova (1st year PhD Student)

Jenise Paddayuman (3rd year PhD Student)

Thushara Tennakoon (2nd year PhD Student)