

Francis Ledesma

fl297@berkeley.edu
(973) 405-0798

EDUCATION

University of California, Berkeley, Berkeley, CA <i>Doctor of Philosophy, Chemical and Biomolecular Engineering</i> Research Advisor: Markita P. Landry	Expected May 2024
Cornell University, Ithaca, NY <i>Bachelor of Science, Chemical and Biomolecular Engineering, Minor in Biomedical Engineering</i> <i>Magna Cum Laude</i>	May 2019 GPA: 3.76/4.00

AWARDS

Certificate in Remote Instruction , GSI Teaching & Resource Center, Graduate Division, UC Berkeley	August 2020
NSF Graduate Research Fellowship , National Science Foundation	2019 - 2023
Outstanding Undergraduate Teaching Assistant , Cornell University School of Chemical & Biomolecular Engineering	May 2019
Outstanding Undergraduate Research , Cornell University School of Chemical & Biomolecular Engineering	May 2019
ABRCMS Presentation Award , The American Society for Microbiology	November 2018
ABRCMS Travel Scholarship , The American Society for Microbiology	September 2018
Cornell Engineering Leadership Certification , Cornell Engineering Leadership Program	December 2017
SACNAS Travel Scholarship , Society for Advancement of Chicanos and Native Americans in Science	October 2017
Summer Research Grant , Cornell Engineering Learning Initiatives	May 2016
Dean's List , Cornell University College of Engineering	All Semesters

RESEARCH EXPERIENCE

Landry Research Group <i>NSF Graduate Research Fellow</i>	October 2019 - Present <i>Berkeley, CA</i>
<ul style="list-style-type: none">Developed platform for protein conjugation to single-walled carbon nanotubes for analyte sensing and cargo delivery.Synthesized, characterized, and applied functionalized single-walled carbon nanotubes for native protein attachment.	
Alabi Research Group <i>Undergraduate Researcher</i>	May 2016 - May 2019 <i>Ithaca, NY</i>
<ul style="list-style-type: none">Optimized the enzymatic site-specific conjugation of synthetic tri-functional linkers to monoclonal antibodies.Analyzed the efficacy of synthetic polymers as scaffolds for drug delivery and diagnostics purposes.	
Merck & Company, Inc. <i>Chemical Engineering Research & Development Intern</i>	May 2018 - August 2018 <i>Rahway, NJ</i>
<ul style="list-style-type: none">Discerned the efficacy of using TTP Labtech's Dragonfly for dispensing chromatography resins and enzyme solutions.Designed high-throughput screening protocol to quantify resin adsorption capacity and kinetics to inform scale-up conditions.Composed and implemented a 43-page standard operating procedure for determining Dragonfly resin dispensing repeatability.	
Sedlak Research Group <i>Undergraduate Researcher</i>	June 2017 - August 2017 <i>Berkeley, CA</i>
<ul style="list-style-type: none">Determined the affinity and capacity of manganese-oxide coated sand for metal contaminants in urban stormwater treatment.Evaluated effect of pH on sorption capacity and affinity of sand for lead, copper, chromium, cadmium, zinc, and phosphorous.	

PUBLICATIONS

- Ledesma, F.**, Nishitani, S., Cunningham, F.J., Hubbard, J.D., Lui, A., Chio, L., Murali, A., Landry, M.P. Covalent Attachment of Horseradish Peroxidase to Single-Walled Carbon Nanotubes for Hydrogen Peroxide Detection. *bioRxiv* 2023.12.14.571773 DOI: 10.1101/2023.12.14.571773 (under peer review)
- Ledesma, F.**, Ozcan, B., Sun, X., Medina, S.M., Landry, M.P. Nanomaterial Strategies for Delivery of Therapeutic Cargoes *Advanced Functional Materials* **2022** 4, 2107174 DOI: 10.1002/adfm.202107174
- Jeong, S., González-Grandio, E., Navarro, N., Pinals, R.L., **Ledesma, F.**, Yang, D., Landry, M.P. Extraction of Viral Nucleic Acids with Carbon Nanotubes Increases SARS-CoV-2 Quantitative Reverse Transcription Polymerase Chain Reaction Detection Sensitivity. *ACS Nano* **2021**, 15, 10309-10317 DOI: 10.1021/acsnano.1c02494
- Pinals, R.L., **Ledesma, F.**, Yang, D., Navarro, N., Jeong, S., Pak, J.E., Kuo, L., Chuang, Y., Cheng, Y., Sun, H., Landry, M.P. Rapid SARS-CoV-2 Spike Protein Detection by Carbon Nanotube-Based Near-Infrared Nanosensors. *Nano Letters* **2021** 21, 2272-2280 DOI: 10.1021/acs.nanolett.1c00118

4. Pinals, R.L., Chio, L., **Ledesma, F.**, Landry, M.P. Engineering at the Nano-Bio Interface: Harnessing the Protein Corona Toward Nanoparticle Design and Function. *Analyst* **2020** 145, 5090-5112 DOI: 10.1039/D0AN00633E
3. Sorkin, M.R., Walker, J.A., **Ledesma, F.**, Torosian, N.P. & Alabi, C.A. Design of Protein-based “Turn On” Molecular Probes for Intracellular Bond Cleavage. *Mol. Syst. Des. Eng.* **2020**, 5, 385-391 DOI: 10.1039/C9ME00147F
2. Walker, J.A., Sorkin, M.R., **Ledesma, F.**, Kabaria, S.R., Barfield, R.M., Rabuka, D. & Alabi, C.A. Hydrophilic Sequence-Defined Crosslinkers for Antibody-Drug Conjugates. *Bioconjugate Chemistry* **2019** 30 (11), 2982-2988 DOI: 10.1021/acs.bioconjchem.9b00713
1. Walker, J.A., **Ledesma, F.**, Bohn, J.J., Sorkin, M.R., Kabaria, S.R., Thornlow, D.N. & Alabi, C.A. Substrate Design Enables Heterobifunctional, Dual “Click” Antibody Modification via Microbial Transglutaminase. *Bioconjugate Chemistry* **2019** 30 (9), 2452-2457 DOI: 10.1021/acs.bioconjchem.9b00522

TECHNICAL SKILLS

Analytical Skills: LC-MS, ICP-MS, Flow Cytometry, ¹H and ¹³C NMR, Gel Electrophoresis, Cell Proliferation Assays

Chromatography: FPLC, HPLC, TLC, Hydrophobic Interaction Chromatography

Molecular Biology: Bacterial Cell Culture, Mammalian Cell Culture, Antibody Purification, Protein Expression and Purification

Chemical Synthesis: Carbon Nanotube Functionalization, Copper-free Click Chemistry, Organic Separation

Characterization: Near-Infrared Fluorescence Spectrometry and Microscopy, UV-Vis-IR Absorbance, Atomic Force Microscopy

CONFERENCE PRESENTATIONS

F. Ledesma, S. Nishitani, F.J. Cunningham, L. Chio, A. Murali, & M.P. Landry. “Covalent Attachment of Horseradish Peroxidase to Single-Walled Carbon Nanotubes for Hydrogen Peroxide Detection” Annual Meeting of the American Institute of Chemical Engineers, November 2023. Oral Presentation.

R. Pinals, L. Chio, **F. Ledesma**, & M.P. Landry. “Harnessing the Protein Corona Towards Carbon Nanotube-Based Sensor Design” Annual Meeting of the American Institute of Chemical Engineers, Virtual, November 2020. Oral Presentation.

R. Pinals, **F. Ledesma**, L. Chio, & M.P. Landry. “A Protein Corona-Based Strategy for Carbon Nanotube Sensors” Electrochemical Society Meeting PRiME, Virtual, October 2020. Oral Presentation.

F. Ledesma, J.A. Walker, J.J. Bohn, S.R. Kabaria, M.R. Sorkin, D.N. Thornlow, & C.A. Alabi. “Site-specific Dual “click” Modification of Native Antibodies via Microbial Transglutaminase.” Annual Biomedical Research Conference for Minority Students, Indianapolis, IN, November 2018. Poster Presentation.

J.A. Walker, **F. Ledesma**, M.R. Sorkin, S.R. Kabaria, & C.A. Alabi. “Investigating the Effect of Cross-linker Branching and Conjugation Site on the Stability and Efficacy of Antibody-drug Conjugates.” Annual Meeting of the American Institute of Chemical Engineers, Pittsburgh, PA, October 2018. Oral Presentation.

J.A. Walker, J.J. Bohn, **F. Ledesma**, M.R. Sorkin, S.R. Kabaria, & C.A. Alabi. “Design and Synthesis of Multifunctional Antibody Bioconjugates”, Gordon Research Conference: Drug Carriers in Medicine & Biology, West Dover, VT, August 2018. Poster Presentation.

F. Ledesma, J. A. Charbonnet, D. L. Sedlak. “Removal of Dissolved Metals by Engineered Geomedia for Urban Stormwater Treatment”, 2017 SACNAS National Diversity in STEM Conference, Salt Palace Convention Center, Salt Lake City, Utah, October 2017. Poster Presentation.

J. A. Walker, **F. Ledesma**, C.A. Alabi. “Design of Particle-specific Capture Agents via Target-guided Synthesis”, 14th International Nanomedicine & Drug Delivery Symposium, Johns Hopkins University, Baltimore, MD, September 2016. Poster Presentation.

TEACHING EXPERIENCE

CHMENG 142: Chemical Kinetics and Reaction Engineering

August 2022 - December 2022

CHMENG 142: Chemical Kinetics and Reaction Engineering

August 2020 - December 2020

Graduate Student Instructor

Berkeley, CA

- Led discussion sections of 25 students to review and practice course material.
- Graded student examinations and held weekly office hours.
- Gave lecture on surface catalysis when professor was unavailable.

CHEME 3900: Chemical Kinetics and Reactor Design

January 2019 - May 2019

ENGRD 2190: Mass and Energy Balances

August 2018 - December 2018

ENGRI 1120: Introduction to Chemical Engineering

August 2017 - December 2017

Teaching Assistant

Ithaca, NY

- Presented problem solutions to over 160 students during weekly recitation sessions.
- Graded student problem sets, quizzes, and examinations and held weekly office hours.
- Gave a lecture on energy balances to students when professor was unavailable.
- Attended weekly meetings to propose engaging and comprehensive problem set questions.

LEADERSHIP AND OUTREACH EXPERIENCE

CBE Graduate Student Advisory Committee

June 2022 - June 2023

President

Berkeley, CA

- Served as liaison between Chemical Engineering PhD student body and department faculty to advocate for student interests.
- Facilitated meetings among the student body to organize events and initiatives to better student life.
- Coordinated with officers to oversee critical department functions such as recruitment, social events, and climate improvement.

Pilipinx Academic Student Services: Pathways 2022

March 2022

Graduate Student Panelist

Berkeley, CA

- Provided perspective and insight as panelist for Filipino undergraduate students interested in graduate school.

West Contra Costa Unified School District: STEM Fair 2022

February 2022

Engineering/Innovation/Technology Judge

Virtual

- Reviewed and judged student project presentations and provided critical feedback on experimental techniques.

Oakland Unified School District: Science and Engineering Fair 2020

May 2020

Judge

Virtual

- Reviewed and judged student project presentations and provided critical feedback on experimental techniques.

Bay Area Scientists Inspiring Students (BASIS)

September 2019 - Present

Member

Berkeley, CA

- Conduct hands-on science seminars about density and phases of matter for elementary students in the Bay Area.

Cornell ChemE Crash Course (FourC)

November 2018 - May 2019

President

Ithaca, NY

- Held experimental and lecture courses each week for high school students interested in chemical engineering.
- Managed team members crafting lesson plans covering fundamental aspects of engineering.
- Corresponded with local science teachers to advertise and engage students in disadvantaged communities.

American Institute of Chemical Engineers Cornell Chapter

April 2018 - April 2019

Treasurer

Ithaca, NY

- Appropriated a budget of over \$4000 for events designed to promote camaraderie among chemical engineers at Cornell.
- Coordinated networking events and information sessions with companies from various industries.

Cornell Outdoor Odyssey

November 2015 - May 2019

Guide

Ithaca, NY

- Led outdoor pre-orientation trips for incoming freshmen to aid the adjustment to college and foster appreciation for nature.
- Taught various outdoor survival skills including knot tying, water purification, and plant identification.
- Formulated hiking routes, campsite locations, food budgets, and group-bonding activities.

Cornell Engineering Learning Initiatives

August 2016 - May 2019

Engineering Peer Advisor

Ithaca, NY

- Advised incoming freshmen on navigating life as a first-year student in the College of Engineering.
- Served as a mentor for freshmen and answer social and academic questions.
- Cooperated with other Peer Advisors to effectively create a welcoming environment for freshmen.