

LISA A. ANDERSON

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Curriculum Vitae

EDUCATION

Ph.D., Organic Chemistry, Designated Emphasis in Biotechnology 2009 – 2015

University of California, Davis

Dissertation: "*Chemical Stimulation of Lipid Production in Microalgae and Analysis by NMR Spectroscopy for Biofuel Applications*"

B.A., Biochemistry, Minor in Anthropology, Concentration in Environmental Science 2005 – 2009

Albion College, Michigan

Cum Laude, Departmental Honors

Honors thesis: "*Anti-cancer Drug Discovery: a Green Chemistry Approach*"

PROFESSIONAL EXPERIENCE

Postdoctoral Scholar

Department of Chemical Engineering, Massachusetts Institute of Technology

April 2015 – present

Research Advisor: Kristala L. Jones Prather, Associate Professor [\[link\]](#)

- Characterized metabolic burden in the performance of genetic circuits as part of the NIH Center for Integrative Synthetic Biology
- Assembled, screened and characterized heterologous glucaric acid pathway in *S. cerevisiae* for sustainable chemical and fuel production as part of the DOE Joint Genome Institute Community Science Program, Synthetic Biology
- Developed internal platform for measuring metabolites by LC-MS/MS and GC-MS
- Appointed to MIT Green Lab committee; led Prather Lab to more sustainable practices
- Founded the MIT Postdoc Organization for Women Engaged in Research (POWER)
- Served as EHS Representative for maintaining safe laboratory environment by complying with MIT EHS regulations, performing weekly inspections, arranging and providing training, disseminating EHS information

Graduate Research Fellow (NSF GRFP)

2009 – 2015

Department of Chemistry, University of California, Davis

Research Advisor: Annaliese K. Franz, Associate Professor [\[link\]](#)

DEB Advisor: Judith Kjelstrom, Director, Designated Emphasis in Biotechnology [\[link\]](#)

- Discovered chemical triggers that modulate lipid metabolism in microalgae
- Designed project to produce biofuel from non-traditional sources such as wastewater
- Developed methods to characterize lipid composition and conversion to biodiesel
- Mentored six undergraduate researchers on algae chemical biology research projects
- Led collaboration with cross-disciplinary teams in Biological and Agricultural Engineering, Food Science and Technology, Plant Biology, and Metabolomics
- Assisted in grant writing, manuscript preparation, and reviewer for peer-review journals
- Initiated Green Lab Certification program in Franz Lab and for the Department

Doctoral Research Intern

Screening and Analytics; BioAnalytics and Metabolomics

May – Oct. 2014

Amyris, Inc., Emeryville, California [\[link\]](#)

- Prepared & extracted yeast samples to evaluate renewable fuels & chemicals production
- Developed & applied chromatographic and mass spectrometry methods for metabolite and derived-compound analysis; Operated and maintained LC-MS/MS
- Investigated fed ^{13}C sugar flux and bottleneck ID for improving production and pathway design; contributed to a multi-'omic' team
- Designed a high-throughput colorimetric assay coupled to robotics
- Prepared technical reports and integrated results into project planning as part of a cross-disciplinary team

- Teaching Assistant** 2015
 Department of Chemical Engineering, Massachusetts Institute of Technology
 • Assisted in organizational duties for MIT Professional Education Short Course on Fermentation Technology directed by Kristala L. J. Prather and Daniel I. C. Wang
- Teaching Assistant** 2009 – 2011
 Department of Chemistry, University of California, Davis
 • Designed lectures and taught discussion and laboratory sessions for General Chemistry, Organic Chemistry, Bio-organic Chemistry
- Fellow, EPA Environmental Management Studies Fellowship Program** May – Aug. 2008
 Office of Superfund Remediation and Technology Innovation
 US EPA Headquarters, Arlington, Virginia
 Project Advisor: Elizabeth Holman, MSc., Ed.M., Physical Scientist
 • Integrated policy and teamwork in a governmental setting at the EPA National HQ
 • Formulated a report on analytical methods for measuring carbon sequestration on remediated Superfund sites
 • Absorbed practical research experience in a governmental office with the goal of increasing public awareness about environmental issues
- Research Associate, NSF Research Experience for Undergraduates (REU) Program** May – Aug. 2007
 New Mexico Institute of Mining and Technology, Socorro, New Mexico
 Project Advisor: Dr. Alexander Kornienko, Associate Professor, Department of Chemistry
 Thesis Advisor: Dr. Cliff Harris, Associate Professor, Department of Chemistry, Albion College
 • Synthesized and characterized medicinal compounds using green chemistry techniques
 • Evaluated cancer-killing properties of compounds in multiple cell lines
 • Developed skills in time-management, project management, and publication writing.
 • Prepared research results for a manuscript and presentations at multiple symposiums

HONORS AND AWARDS

- Albion College Young Alumni Award 2017
[NEB Passion in Science, Environmental Stewardship Award](#) [see also: [video link](#)] 2016
 NSF Graduate Research Fellowship 2011 – 2014
[Algae Foundation Student Travel Award](#) to attend Algae Biomass Summit 2014
 Graduate Student Association Student Travel Award 2014
[Greenovation Champion](#), Kimberly-Clark Glove Recycling Program 2014
 Esteemed Educator Award, Dixon High School, California 2012
 Eli Lilly/ACS Women Chemists Committee Travel Award 2012
 Bradford Borge Fellowship, Dept. of Chemistry, UC Davis 2009 – 2010
 Lux Fiat Leadership Award, Albion College 2009
 Outstanding Senior, Albion College Environmental Institute 2009
 Udall Scholar, Honorable Mention for Environmental Service 2008
 Richard K. Vitek Chemistry Scholarship, Albion College 2008
 Outstanding Student Service Award, Michigan Campus Compact 2008

INSTITUTIONAL AND PROFESSIONAL SERVICE

- [MIT Climate Action Advisory Committee](#), Postdoc Appointee 2016 – present
 MIT Environmental Science Initiative, Advisory Board, Postdoc Appointee 2016 – present
 Proposal Review, DOE Joint Genome Institute Community Science Program 2016
 Manuscript Reviewer, the Journal of the American Oil Chemists' Society (JAOCS) 2012-2015

PUBLICATIONS AND PATENTS

“Chemical Signaling and Microalgae Biofuels: From Enhancers to Symbiosis.” **Lisa A. Anderson** and Annaliese K. Franz, *review in preparation*.

“Screening oleaginous microalgae for modulators of lipid productivity.” Annaliese K. Franz, Megan A. Danielewicz, Diana M. Wong, **Lisa A. Anderson**, and Jordan R. Boothe. *ACS Chem. Bio.*, 2013, 8, 1053. [10.1021/cb300573r](https://doi.org/10.1021/cb300573r) (I.F. 5.331)

“Methods for increasing lipid levels and producing triacylglycerols in algae.” Annaliese K Franz, Megan A. Danielewicz, Diana M. Wong, and **Lisa A. Anderson**, US Patent 8.778,643, filed March 13, 2012, and issued July 14, 2014. [WO2013138523 A1](#)

“Real-time monitoring of transesterification by ¹H NMR spectroscopy: catalyst comparison and improved calculation for biodiesel conversion.” **Lisa A. Anderson** and Annaliese K. Franz, *Energy Fuels*, 2012, 26, 6404. [10.1021/ef301035s](#) (IF 2.790)

“Triacylglycerol profiling of marine microalgae by mass spectrometry.” Megan A. Danielewicz, **Lisa A. Anderson**, and Annaliese K. Franz, *J. Lipid Res.* 2011, 52, 2101. [10.1194/jlr.D018408](#) (IF 5.559)

“Three-component synthesis and anticancer evaluation of polycyclic indenopyridines lead to the discovery of a novel indenoheterocycle with potent apoptosis inducing properties.” Madhuri Manpadi, Pavel Y. Uglinskii, Shiva K. Rastogi, Karen M. Cotter, Yin-Shan C. Wong, **Lisa A. Anderson**, Amber J. Ortega, Severine Van slambrouck, Wim F. A. Steelant, Snezna Rogelj, Paul Tongwa, Mikhail Y. Antipin, Igor V. Magedov, and Alexander Kornienko, *Org. Biomol. Chem.* 2007, 5, 3865. [10.1039/b713820b](#) (IF 3.562)

LEADERSHIP ACTIVITIES

MIT Glove Recycling Team	2016 – present
MIT Green Labs Committee , Researcher Appointee	2016 – present
MIT Postdoc. Org. for Women Engaged in Research (POWER) , Founder and Chair	2015 – present
MIT Energy Club, Climate Change Committee Co-Chair	2016 – present
MIT Energy Club, BioEnergy Co-Chair	2015 – 2016
Graduate Student Association, Chemistry Chair	2010 – 2014
Albion College Jazz Ensemble	2005 – 2009
Kappa Kappa Psi Honorary Band Fraternity, President ('08-'09)	2007 – 2009
Albion College Sustainability Council, Co-founder	2008 – 2009
NCAA Women's Softball Athlete, Division III	2005 – 2007

MENTORING AND OUTREACH

Research Mentor for Undergraduate Student, Prather Lab, MIT Mentored undergraduate researcher on molecular biology and metabolic engineering techniques.	2016 – present
AWIS Mentor Circle Program Participated as mentee in Association for Women in Science (AWIS) Mentor Circle Program in Boston, Massachusetts. The group set important development goals and built competence and character to reach goals.	2015 – 2016
Judge, iGEM Evaluated synthetic biology projects from around the world at the International Genetically Engineered Machine (iGEM) Competition in Boston, Massachusetts. Ensured that teams adhered to Responsible Conduct in Research ethics.	2015, 2016
Research Mentor for Undergraduate Students, Franz Lab, UC Davis Mentored 7+ undergraduate researchers on algae growing techniques, lipid analysis, and biofuel conversion research projects. Assisted in obtaining research funding, writing research reports, and preparing for presentations	2011 – 2015
Team Leader, STEM for Girls Led a group of girls at STEM for Girls, an annual all-day event that aims to build girls' self-confidence and foster an interest in STEM fields by exposing girls to hands-on workshops, lab tours and demonstrations, and real-life scientists.	April 2014
Judge, Teen Biotech Challenge, Biotechnology Program Reviewed and rated over 30 websites created by high school students on current issues in bioenergy, agriculture, and medicine. Winners are announced at an awards banquet on campus at UC Davis.	2011 – 2013
Research Mentor for High School Students, ACS Project SEED Program Mentored a high school student over two summers with continuation into the school year through ACS SEED, a program for high schoolers from disadvantaged backgrounds.	2011 – 2013

Advised in individual laboratory project with advice given on laboratory skills, career goals, and personal development. The student presented his results at the ACS Spring 2012 Meeting in San Diego.

Mentor, UC Davis Science Outreach Arboretum Project 2011 – 2013

Assisted local high school students on a team project to prepare a report on a plant containing interesting bioactive natural products. The winner was chosen for installment of a plaque in the UC Davis Arboretum.

E-Mentor for High School Students, Biotechnology Program 2012 – 2013

Mentored local high school student by email on a weekly basis sharing my experiences in education, training and career decisions. Culminated by meeting the student at an end of the year reception.

Guest Speaker, Energy Seminar, Davis High School 2011 – 2012

Prepared, presented and discussed “The Chemistry of Algae Biofuels: From Pond Scum to Biodiesel” as part of an Energy Seminar Series at Davis High School.

Research Mentor for High School Students, Young Scholars Program (YSP), UC Davis 2010 – 2012

Mentored 3 high school students in their individual summer research projects in my research lab.

Mentor and Lab Assistant, COSMOS, UC Davis June 2010

Assisted high school students in weekly chemistry laboratory experiments as a part of the California State Summer School for Mathematics & Science (COSMOS) program. Worked along side faculty members Annaliese Franz and Mark Mascal.

Mentor and Lab Assistant, UC Davis Biodiesel Project June 2010

Assisted students in laboratory experiments for the development of an educational and business model to turn campus dining hall waste vegetable oil into biodiesel fuel for on-campus use

SELECTED PRESENTATIONS

“Effects of Metabolic State and Perturbations on Genetic Device Performance.” **Lisa A. Anderson** and Kristala L. J. Prather, Poster Presentation, 5th Annual MIT Synthetic Biology Center Symposium, January 25, 2016.

“Small molecule modulators of lipid production in microalgae and NMR spectroscopic analysis of lipids for biofuel applications.” **Lisa A. Anderson**, Oral Presentation, Algae Biomass Summit, San Diego, September 30, 2014.

“Small molecule modulators of lipid production in microalgae and NMR spectroscopic analysis of lipids for biofuel applications.” **Lisa A. Anderson**, Andrew R. Burch, and Annaliese K. Franz, Oral Presentation, Division of Environmental Chemistry, 248th American Chemical Society National Meeting, San Francisco, August 2014.

“From Pond Scum to Biodiesel: How Algae Can Power Our World,” **Lisa A. Anderson**, Oral Presentation, Interdisciplinary Graduate and Professional Student Symposium, UC Davis, April 4, 2014.

“Chemical Genetics and Metabolomics to Study Microalgae Lipid Productivity.” **Lisa A. Anderson**, Oral Presentation, Chemical Biology Innovation Group, Department of Chemistry, University of California, Davis, January 22, 2014.

“Phenotypic Screening with Oleaginous Microalgae Reveals Modulators of Lipid Productivity.” **Lisa A. Anderson**, Megan A. Danielewicz, Diana M. Wong, Jordon R. Boothe, and Annaliese K. Franz, Oral presentation, Chemical Biology in the Bay Area Day, UC San Francisco, June 15, 2013.

“Phenotypic Screening with Oleaginous Microalgae Reveals Modulators of Lipid Productivity.” **Lisa A. Anderson**, Megan A. Danielewicz, Diana M. Wong, Jordon R. Boothe, and Annaliese K. Franz, Poster presentation, Food and Fuel for the 21st Century Symposium, San Diego Center for Algae Biotechnology, April 20, 2013.

“Chemical triggers as a new approach to increase biomass and lipid production in microalgae.” **Lisa A. Anderson** and Annaliese K. Franz, Oral presentation, California Institute of Food and Agricultural Research (CIFAR) Technology Conference XXXI. UC Davis, October 2012.

“Analysis of microalgae lipids and kinetics of transesterification using ^1H NMR spectroscopy.” **Lisa A. Anderson**, and Franz A. K., [Oral presentation](#), Division of Energy and Fuels, 244th American Chemical Society National Meeting, Philadelphia, PA, United States, August 2012.

SKILLS SUMMARY

Management, Leadership, and Mentoring

- Leader in sustainability; initiated programs for glove recycling program and Green Lab certification
- Training in entrepreneurial endeavors and patent processes
- Founder of [Postdoctoral Organization for Women Engaged in Research](#) @ MIT
- Demonstrated management of team projects and collaborations
- Mentor of 8+ undergraduate and high school student researchers

Chemistry

- Biomolecule extraction for metabolomics and lipidomics, including coupling to robotics
- Biofuel conversion via transesterification and catalyst screening
- Organic/bioanalytical chemistry wet lab techniques; biochemical separation, analysis, & method development
 - Instrumentation: LC-MS/MS (triple quad, AB Sciex), GCMS (Shimadzu, Agilent), HPLC (Shimadzu), NMR spectroscopy (Bruker, Agilent), UV/Vis and microplate spectrophotometry and fluorimetry
 - Analysis software: mass spectrometry (Analyst, MultiQuant, MAVEN), NMR (vNMRj, TopSpin, Mestrenova), data visualization (Metaboanalyst, Spotfire), structure and biochemical pathways (ChemDraw, KEGG)

Biotechnology

- Molecular biology techniques and DNA design (i.e. modern and traditional cloning, PCR)
- Aseptic culture techniques for a variety of microorganisms (i.e. bacteria, yeast, microalgae)
- Cellular screening and HTP assay development
- Extensive coursework and training in biotechnology

PROFESSIONAL SOCIETY MEMBERSHIPS

Association for Women in Science	2013 – present
American Chemical Society	2007 – 2015
Algal Biomass Organization	2011 – 2014

INTERESTS

Running (multiple medals, 1st place in division), team sports, hiking, gardening, sustainable lifestyles, and playing trombone