

Curriculum Vitae

SARA C. MASSEY

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EDUCATION

THE UNIVERSITY OF CHICAGO

Ph.D. in Physical Chemistry
M.S. in Physical Chemistry
National Defense Science and Engineering Graduate (NDSEG) Fellow
Advisor: Gregory S. Engel

Chicago, IL
2019 (*expected*)
December 2014
2015-2018

THE UNIVERSITY OF TEXAS AT AUSTIN

B.A. in Chemistry, B.S. in Kinesiology
Advisor: Katherine A. Willets

Austin, TX
May 2010

RESEARCH EXPERIENCE

THE UNIVERSITY OF CHICAGO, CHEMISTRY DEPARTMENT

Graduate Research Assistant, Engel Group

- Research femtosecond timescale energy transfer pathways and photoprotective mechanisms in bacterial light harvesting complexes, photosynthetic membranes, and live cells
- Develop and perform ultrafast nonlinear spectroscopies, including two-dimensional electronic spectroscopy, two-dimensional anisotropy spectroscopy, and transient absorption spectroscopy
- Write code to process and analyze complex datasets, and communicate results to the scientific community
- Culture bacterial cells and isolate pigment-protein complexes

Chicago, IL
2013-present

PELTON THERAPEUTICS, INC.

Research Associate, Drug Metabolism and Pharmacokinetics

- Developed methods and analyzed novel drug small molecules by LC/MS/MS in support of oncology drug discovery
- Revised protocols & performed *in vitro* assays including microsomal stability, plasma-protein binding, CYP inhibition
- Performed *in vivo* pharmacokinetic and tolerability experiments in rodents, including dosing and blood collection
- Modeled pharmacokinetic data using WinNonlin
- Presented findings to fellow scientists and made recommendations for future studies

Dallas, TX
2012-2013

SIGNATURE SCIENCE, LLC

Chemist, Analytical Chemistry Group

- Developed methods and analyzed small molecule explosive, pesticide, and drug samples using analytical techniques, including GC/MS, HPLC/MS, LC/MS/MS, IR, Fluorimetry, and UV-Vis instrumentation
- Processed and analyzed data to create impurity profiles of synthetic products
- Developed new products and techniques to meet client needs
- Reported findings and communicated with clients
- Developed experimental plans and coordinated activities to meet project goals and deadlines

Austin, TX
2010-2012

THE UNIVERSITY OF TEXAS AT AUSTIN, CHEMISTRY DEPARTMENT

Undergraduate Research Assistant, Willets Laboratory

- Synthesized gold and silver core-shell nanoparticles (spheres, rods, prisms)
- Functionalized nanoparticles with reactive silane molecules and fluorescent dye molecules
- Characterized nanoparticles with dark field scattering, fluorescence, and scanning/transmission electron microscopy

Austin, TX
2009-2010

CENTERS FOR DISEASE CONTROL AND PREVENTION
ORISE Summer Research Fellow, Protein Biomarker Laboratory

Atlanta, GA
2009

- Performed gas chromatography-mass spectrometry analysis of trans-fat levels
- Prepared Pentafluorobenzyl-fatty acid derivatives from plasma samples
- Conducted literature searches on conventional GC/MS methods and fatty acid methyl ester sample preparation

TEACHING EXPERIENCE

THE UNIVERSITY OF CHICAGO, CHEMISTRY DEPARTMENT

Chicago, IL

Lecturer, Inaugural Benjamin Ball Freud Teaching Fellow, Introductory General Chemistry *Fall 2018, Winter 2019*

- Engage students in a student-centered active learning general chemistry class for 25 first-year undergraduates
- Design formative assessments in the form of problem sets and minute-papers
- Create summative assessments in the form of midterm and final exams

CHICAGO CENTER FOR TEACHING

Chicago, IL

Senior Teaching Consultant

2015-present

- Observe classes taught by graduate student instructors at the University of Chicago and provide pedagogical feedback through meetings with the instructor and a written report
- Design and lead pedagogy sessions for Teaching@Chicago, an annual orientation for graduate student instructors
- Participate in twice quarterly teaching consultant meetings to discuss pedagogical techniques, including leading effective discussions, active learning, collaborative learning, rubrics, and asking effective questions

THE UNIVERSITY OF CHICAGO, CHEMISTRY DEPARTMENT

Chicago, IL

Discussion Teaching Assistant, Chemical Kinetics and Dynamics

Spring 2016

- Designed inquiry-based discussion sections that consisted of a mini-lecture, small team-based problem solving, and active discussion with students working out concepts on the board
- Graded homework problems and exams, providing written feedback to students to inform their learning

THE UNIVERSITY OF CHICAGO, CHEMISTRY DEPARTMENT

Chicago, IL

Collaborative Learning Teaching Assistant, Introductory General Chemistry

Fall 2015, Winter 2016

- Facilitated small-group problem solving sessions in which students worked on general chemistry problems within a guided inquiry learning structure
- Encouraged active participation and positive interdependence within each group through use of Process Oriented Guided Inquiry Learning (POGIL) roles
- Posed questions to encourage students to think critically about problems and defend the how and why of the steps they were taking in the problem solving process

THE UNIVERSITY OF CHICAGO, CHEMISTRY DEPARTMENT

Chicago, IL

Laboratory and Discussion Teaching Assistant, General Chemistry

Fall 2013, Winter 2014, Spring 2014

- Awarded the Nathan Sugarman Teaching Award in General Chemistry
- Led discussion sections to introduce and review concepts that pertained to laboratory experiments
- Supervised laboratory experiments for up to 16 students
- Posed questions during lab sessions to push students to think about what was happening during their lab experiments and relate the labs to concepts they had learned in their lecture course
- Created rubrics and graded laboratory reports, providing formative written feedback to students to promote learning

HONORS AND AWARDS

- 2018-2019 Inaugural Benjamin Ball Freud Teaching Fellowship, Department of Chemistry, University of Chicago
- 2015-2018 National Defense Science and Engineering Graduate (NDSEG) Fellowship
- 2018 Inclusive Pedagogy Grant, Office of the Provost, Diversity and Inclusion Initiative, University of Chicago
- 2018 Graduate Council Travel Fund Award, University of Chicago
- 2017 The Joan Shiu Chemistry Department Student Service Award, University of Chicago
- 2016 American Chemical Society Women Chemists Committee/Merck Research Award
- 2016 Windt Chemistry Graduate Student Travel Award, University of Chicago
- 2016 UChicagoGRAD Travel Award, University of Chicago
- 2014 The Nathan Sugarman Teaching Award in General Chemistry, University of Chicago
- 2011 IEEE Homeland Security Conference Best Paper Award: Biometrics, Forensics & Physical Security Track
- 2010 College of Natural Sciences Book Award in Analytical Chemistry, The University of Texas at Austin
- 2008 College of Natural Sciences Leadership Certificate, The University of Texas at Austin

PUBLICATIONS

1. **Massey, S.C.**, Yeh, S-H., Ting, P-C., Dahlberg, P.D., Sohail, S.H., Allodi, M.A., Martin, E.C., Kais, S., Hunter, C.N., and Engel, G.S. Orientational Dynamics of Transition Dipoles and Exciton Relaxation in LH2 from Ultrafast Two-Dimensional Anisotropy. Manuscript in preparation for submission to *J. Phys. Chem. Lett.*
2. Yeh, S-H.*, **Massey, S.C.***, Ting, P-C., Dahlberg, P.D., Soltau, S., Flanagan, M.L., Kais, S., and Engel, G.S. Effects of Static Disorder on Two-Dimensional Anisotropy. Manuscript in preparation for submission to *J. Chem. Phys.* [*Equal Contribution].
3. Allodi, M.A., Otto, J.P., Sohail, S.H., Saer, R.G., Wood, R.E., Rolczynski, B.S., **Massey, S.C.**, Ting, P-C., Blankenship, R.E., and Engel, G.S. Redox Conditions Affect Ultrafast Exciton Transport in Photosynthetic Pigment-Protein Complexes. *J. Phys. Chem. Lett.*, 9, 89-95 (2018) DOI: 10.1021/acs.jpcllett.7b02883.
4. Dahlberg, P.D., Ting, P-C., **Massey, S.C.**, Allodi, M.A., Martin, E.C., Hunter, C.N., and Engel, G.S. Mapping the Ultrafast Flow of Harvested Solar Energy in Living Photosynthetic Cells. *Nat. Commun.*, 8, 988 (2017) DOI: 10.1038/s41467-017-01124-z.
5. Sohail, S.H., Dahlberg, P.D., Allodi, M.A., **Massey, S.C.**, Ting, P-C., Martin, E.C., Hunter, C.N., and Engel, G.S. Broad Manifold of Excitonic States in Light-Harvesting Complex 1 Promotes Efficient Unidirectional Energy Transfer *in vivo*. *J. Chem. Phys.*, 147, 131101 (2017) DOI: 10.1063/1.4999057.
6. Dahlberg, P.D., Ting, P-C., **Massey, S.C.**, Martin, E.C., Hunter, C.N., and Engel, G.S. Electronic Structure and Dynamics of Higher-Lying Excited States in Light Harvesting Complex 1 from *Rhodobacter sphaeroides*. *J. Phys. Chem. A*, 120, 4124-4130 (2016) DOI: 10.1021/acs.jpca.6b04146.
7. Flanagan, M.L., Long, P.D., Dahlberg, P.D., Rolczynski, B.S., **Massey, S.C.**, and Engel, G.S. Mutations to *R. sphaeroides* Reaction Center Perturb Energy Levels and Vibronic Coupling but Not Observed Energy Transfer Rates. *J. Phys. Chem. A*, 120, 1479-1487 (2016) DOI: 10.1021/acs.jpca.5b08366.
8. Chipuk, J., Mazzitelli, C., Kendall, J., Straight, S., Reaves, M., and **Chamberlin, S.** Tunable, Self-curing Polymers for the Forensic Collection of Latent Signatures from Within Porous Materials. *Homeland Security Affairs*, Supplement 5, Article 5 (2012) DOI: 10.1109/THS.2011.6107885.

CONFERENCES AND MEETINGS

Following Excitonic Pathways in Cyanobacteria by 2D Electronic Spectroscopy. Poster, 256th ACS National Meeting, Boston, MA, August 19-23, 2018.

Probing Dynamics of Delocalization and Energy Transfer in Rhodobacter sphaeroides Using Two-Dimensional Electronic Spectroscopy. Oral, 252nd ACS National Meeting, Philadelphia, PA, August 21-25, 2016.

Two-Dimensional Electronic Spectroscopy Reveals Ultrafast Dynamics in Photosynthetic Bacteria. Oral, 252nd ACS National Meeting, Philadelphia, PA, August 21-25, 2016.

Determination of Domain Size and Light Harvesting Complex Connectivity in Rhodobacter sphaeroides. Oral, 252nd ACS National Meeting, Philadelphia, PA, August 21-25, 2016.

Delocalization and Energy Transfer Dynamics in Rhodobacter sphaeroides from Two-Dimensional Anisotropy Spectroscopy. Oral, The 17th International Photosynthesis Congress on Photosynthesis Research, Maastricht, The Netherlands, August 7-12, 2016.

Delocalization and Energy Transfer Dynamics from Two-Dimensional Anisotropy Spectroscopy of LH2 in Rhodobacter sphaeroides. Poster, Light Harvesting Satellite Meeting of The 17th International Congress on Photosynthesis Research, Egmond aan Zee, The Netherlands, August 4-7, 2016.

Investigating LH2 Dynamics in Detergent and Chromatophores from Rhodobacter sphaeroides. Oral, 41st Midwest/Southeast Photosynthesis Conference, Turkey Run State Park, Marshall, IN, October 23-25, 2015.

Investigating LH2 Dynamics in Detergent and Chromatophores from Rhodobacter sphaeroides. Poster, Photosynthesis Gordon Research Conference and Seminar, Bentley University, Waltham, MA, June 27-July 3, 2015.

Investigating Changes in Energy Transfer Pathways in LH2 Due to a Carotenoid Switch. Poster, 40th Midwest/Southeast Photosynthesis Conference, Turkey Run State Park, Marshall, IN, October 24-26, 2014.

PROFESSIONAL DEVELOPMENT

- 2018 Process Oriented Guided Inquiry Learning (POGIL) North Central workshop
- 2017 Leadership Effectiveness and Development (LEAD) mini-course, Booth School of Business

SKILLS

Laboratory: Two-dimensional electronic spectroscopy, transient absorption spectroscopy, protein isolation, bacterial & algal cell culture, Circular dichroism, UV-Vis, Time resolved fluorescence spectroscopy, Gas chromatography-mass spectrometry (GC/MS), Liquid chromatography-mass spectrometry including single quadrupole, triple quadrupole, and ion trap (LC/MS and LC/MS/MS), FTIR, dark field scattering and fluorescence microscopy, scanning and transmission electron microscopy (S/TEM)

Software: MATLAB, Adobe Illustrator, Agilent ChemStation, Agilent MassHunter, Thermo Xcalibur, WinNonlin

Clearances: Department of Defense, Secret level, active 2010 – 2012

TEACHING SUMMARY

<u>Course</u>	<u>Role</u>	<u>Term</u>	<u>Instructor Rating</u>
Chemistry 101/102 <i>Introductory General Chemistry</i> <i>The University of Chicago</i>	Instructor of Record Collaborative Learning Facilitator TA Collaborative Learning Facilitator TA Lab/Discussion TA Lab/Discussion TA	Fall 2018 Winter 2016 Fall 2015 Winter 2014 Fall 2013	 4.8/5.0 4.9/5.0
Chemistry 263 <i>Chemical Kinetics and Dynamics</i> <i>The University of Chicago</i>	Teaching Assistant	Spring 2016	
Chemistry 113 <i>General Chemistry</i> <i>The University of Chicago</i>	Lab/Discussion TA	Spring 2014	4.5/5.0
Chemistry 301 <i>General Chemistry</i> <i>The University of Texas at Austin</i>	Teaching Assistant	Fall 2008 Spring 2008	

COMMUNITY INVOLVEMENT

- Committee on Teaching and Educational Matters, Department of Chemistry, University of Chicago
- Member and Mentor, Women in Chemistry, University of Chicago
- Senior Teaching Consultant, Chicago Center for Teaching, 2015 – present
- University of Chicago, Department of Chemistry, Ombudsperson, 2016-2017
- Chemistry Rep., Physical Sciences Division Dean of Students Advisory Committee, University of Chicago, 2016-2017
- Guest Engagement & Behind-the-Scenes Tour Guide Volunteer, Shedd Aquarium, 2014 – 2016
- Organizer, Tiger Talks chemistry student seminar series, University of Chicago, 2015 – 2016
- Communicating Science Workshop Organizer, ComSciCon-Chicago, 2015
- Instructor, Science and Technology Outreach and Mentoring Program, 2014 – 2015
- Physical Sciences Division Social Committee, President, University of Chicago, 2014 – 2015
- Member, American Chemical Society, 2009 - present