

GLENNIS E. RAYERMANN

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EDUCATION

Ph.D., Chemistry, University of Washington (UW), Seattle, WA • expected Aug 2018

Advisors: Prof. Sarah L. Keller (UW) and Dr. Greg D. Smith (Indianapolis Museum of Art)

Dissertation Research Areas: cultural heritage conservation science, materials chemistry, fluorescence microscopy, and scanning probe microscopy

M.S., Chemistry, University of Washington, Seattle, WA • Dec 2011

B.S. with Distinction, Chemistry, Harvey Mudd College, Claremont, CA • May 2009

Graduation with Departmental Honors: Chemistry | Humanities, Social Sciences, and the Arts (HSA)

Semester Abroad: University of Paris III and VI, Hamilton College, Paris, France • Jan – Jun 2008

RESEARCH EXPERIENCE

CULTURAL HERITAGE

Conservation Science Laboratory Intern, Indianapolis Museum of Art (IMA) at Newfields, Indianapolis, IN

Mar – Jul 2017

Executed a technical study of IMA #51.98 *Madonna and Child*, an Italian Trecento-style panel painting, in order to investigate its authenticity. Deployed imaging techniques, pyrolysis gas chromatography/mass spectrometry (py/GC-MS), Fourier transform infrared (FTIR) spectroscopy, Raman spectroscopy, X-ray fluorescence (XRF) spectrometry, scanning electron microscopy (SEM) coupled with energy-dispersive X-ray spectroscopy (EDX), chemical staining, and polarized light microscopy (PLM). Employed conservation best practices in art handling, sampling, and sample preparation.

Printing Press Researcher and Assistant, Department of HSA, Harvey Mudd College, Claremont, CA

Spring Semester 2007

Operated a c.1850 Columbian iron printing press and generated specimen sheets for the available fonts. Researched the history of the Columbian printing press with a focus on materials science. Published results in *The Book Club of California Quarterly News-Letter*.

CHEMISTRY

Graduate Research Assistant, Keller Lab, University of Washington, Seattle, WA

May 2015 – present

Designed and conducted experiments to rigorously test if liquid-liquid phase separation occurs in unperturbed, living cell membranes. Optimized fluorescence microscopy data collection and processing by implementing highly inclined laminated optical sheet (HILO) illumination and Kalman filtering. Co-wrote article for *Biophysical Journal*.

Graduate Research Assistant, Ginger Lab, University of Washington, Seattle, WA

Jan 2010 – May 2012

Investigated the photodegradation of photovoltaic polymers using attenuated total reflectance (ATR) FTIR spectroscopy, time-of-flight secondary ion mass spectrometry, photoluminescence spectroscopy, scanning Kelvin probe microscopy, and time-resolved electrostatic force microscopy. Created a numerical simulation to support development of a new scanning probe microscopy technique with sub-

microsecond resolution. Crafted a successful User Nanoscience Research Program proposal for experiments at the Center for Nanophase Materials Sciences at Oak Ridge National Laboratory. Published results in *Journal of Physical Chemistry B*, *Nano Letters*, and *Journal of Physical Chemistry C*.

Undergraduate Research Assistant, Van Ryswyk Lab, Harvey Mudd College, Claremont, CA

Jan – Aug 2007 | Aug 2008 – May 2009

Synthesized, characterized, and measured the metal-metal coupling of novel metalloporphyrin dimers.

Undergraduate Research Assistant, Karukstis Lab, Harvey Mudd College, Claremont, CA

Aug – Dec 2007

Mapped the phase behavior of ternary surfactant systems.

PUBLICATIONS

REFEREED JOURNAL ARTICLES

Scott P. Rayermann*, **Glennis E. Rayermann***, Caitlin E. Cornell, Alexey J. Merz, Sarah L. Keller. “Hallmarks of Reversible Separation of Living, Unperturbed Cell Membranes into Two Liquid Phases.” *J. Biophys.*, 2017, 113 (11), pp 2425–2432. DOI: 10.1016/j.bpj.2017.09.029. *Contributed equally to this work.

Guozheng Shao, **Glennis E. Rayermann**, Eric M. Smith, David S. Ginger. “Morphology-Dependent Trap Formation in Bulk Heterojunction Photodiodes.” *J. Phys. Chem. B*, 2013, 117 (16), pp 4654–4660. DOI: 10.1021/jp3090843.

Rajiv Giridharagopal, **Glennis E. Rayermann**, Guozheng Shao, David T. Moore, Obadiah G. Reid, Andreas F. Tillack, David J. Masiello, David S. Ginger. “Submicrosecond Time Resolution Atomic Force Microscopy for Probing Nanoscale Dynamics.” *Nano Lett.*, 2012, 12 (2), pp 893–898. DOI: 10.1021/nl203956q.

Obadiah G. Reid; **Glennis E. Rayermann**; David C. Coffey; David S. Ginger. “Imaging Local Trap Formation in Conjugated Polymer Solar Cells: A Comparison of Time-Resolved Electrostatic Force Microscopy and Scanning Kelvin Probe Imaging.” *J. Phys. Chem. C*, 2010, 114 (48), pp 20672–220677 DOI: 10.1021/jp1056607.

BOOK CHAPTERS, PATENTS, & ADDITIONAL PUBLICATIONS

Glennis E. Rayermann, Anna Stein, Gregory D. Smith. Everything Old is New Again: Investigating a Modern Tempera Fake of a Medieval Panel Painting. Proceedings of the Doerner Institut’s Conference on Tempera Painting Between 1800 and 1950: Experiments and Innovations from the Nazarene Movement to Abstract Art. Archetype Publications: London, *in preparation*.

David Ginger, Rajiv Giridharagopal, David Moore, **Glennis E. Rayermann**, Obadiah Reid. Sub-microsecond-resolution probe microscopy. U.S. Patent (Publication Number) US8686358 B2, Apr 1, 2014.

Rajiv Giridharagopal, **Glennis E. Rayermann**, David S. Ginger. Electrical Scanning Probe Microscopy on Solar Cell Materials. In *Scanning Probe Microscopy for Energy Research*; Dawn A. Bonnell, Sergei V Kalinin, Eds.; Nanoscience and Nanotechnology; World Scientific: Singapore, 2013; pp 39-72.

Jeffrey D. Groves; Alex Hagen; **Glennis Rayermann**. “The Mechanics of the Columbian Press.” *The Book Club of California Quarterly News-Letter*. Volume 74, Number 4, Fall 2009.

GRANT & PROPOSAL WRITING

Proposal-based Fellowships and Grants

Funded fellowships and travel awards (see next section) based on successful proposals include: National Science Foundation (NSF) and National Defense Graduate Fellowships, UW GPSS Travel Grant, UW GSFEI Graduate Student Travel Award, Biophysical Society Education Committee Travel Award, FAIC/True Vue International Professional Development Scholarship Award, and the Young Researcher Travel Grant from the Doerner Institut's Conference on Tempera Painting.

NASA Exobiology Grant Proposal • awarded May 2017

Edited funding proposal for experiments to explore feasible mechanisms of the origins of life on earth. The proposal was funded and currently supports three different laboratories at the University of Washington.

Oak Ridge National Lab Center for Nanophase Materials Sciences User Proposal • awarded Jun 2012

Wrote a proposal for user time to explore the feasibility of band excitation Kelvin Probe Force Microscopy for investigating local charge trapping in organic photovoltaic materials. Communicated with ORNL scientists to design experiments. The proposal was funded and committed instrument and staff time to the project.

FELLOWSHIPS, HONORS, & AWARDS

FELLOWSHIPS

National Science Foundation Graduate Research Fellow • Fall 2011 – Summer 2017

National Defense Science & Engineering Graduate Fellow • Fall 2011 – Summer 2012

ARCS Foundation Fellow, University of Washington, Department of Chemistry • Fall 2009 – Spring 2012

HONORS & AWARDS

University of Washington Department of Chemistry Nominee for Lindau Nobel Laureate Meeting • Fall 2016

American Chemical Society Division of Analytical Chemistry Undergraduate Award • May 2009

Membership in Phi Lambda Upsilon (National Chemistry Honor Society) • May 2009

National Merit Scholarship • Fall 2005 – Spring 2009

TRAVEL AWARDS

UW Graduate and Professional Student Senate (GPSS) Travel Grant • Feb 2017

UW Graduate School Fund for Excellence and Innovation (GSFEI) Graduate Student Travel Award • Jan 2018

The Biophysical Society Education Committee Travel Award • Nov 2017

FAIC/Tru Vue International Professional Development Scholarship Award from the Foundation of the American Institute for Conservation of Historic and Artistic Works • Oct 2017

Young Researcher Travel Grant from the Doerner Institut's 2018 Conference on Tempera Painting • Jul 2017

Fellowship covering registration fees for the Gordon Research Seminar and Conference on "Scientific Methods in Cultural Heritage Research" • Jun 2016

Oak Ridge National Laboratory Center for Nanophase Materials Sciences Student Travel Fellowship • Sep 2011

PRESENTATIONS

UPCOMING TALKS

Glennis E. Rayermann; Scott P. Rayermann; Caitlin E. Cornell; Alexey J. Merz; Sarah L. Keller. Reversible separation of living, unperturbed cell membranes into two liquid phases. Will give an oral presentation at the Biophysical Society of Canada 4th Annual Meeting, Vancouver, BC, Canada, May 25, 2018.

PAST PRESENTATIONS

Glennis E. Rayermann; Anna Stein; Gregory D. Smith. Everything Old is New Again: Investigating a Modern Tempera Fake of a Medieval Panel Painting. Presented at the Doerner Institut's Conference on Tempera Painting Between 1800 and 1950: Experiments and Innovations from the Nazarene Movement to Abstract Art, Munich, Germany, Mar 15, 2018.

Glennis E. Rayermann; Scott P. Rayermann; Caitlin E. Cornell; Alexey J. Merz; Sarah L. Keller. Reversible separation of living, unperturbed cell membranes into two liquid phases. Presented at the Biophysical Society 62nd Annual Meeting, San Francisco, CA, United States, Feb 20, 2018.

Scott P. Rayermann; **Glennis E. Rayermann;** Caitlin E. Cornell; Alexey J. Merz; Sarah L. Keller. Hallmarks of reversible phase separation in living, unperturbed cell membranes. Presented at the Biophysical Society 61st Annual Meeting, New Orleans, LA, United States, Feb 15, 2017.

Glennis E. Rayermann; Obadiah Reid; David Coffey; David S. Ginger. Using time-resolved electrostatic force microscopy to study trap formation in organic photovoltaic devices. Presented at:

ORCAS 2010 International Conference on Energy Conversion, Friday Harbor, WA, United States, Sep 21, 2010.

Gordon Research Conference on Electronic Processes in Organic Materials, South Hadley, MA, United States, Jul 28-29, 2010.

Glennis E. Rayermann; Amanda Hickman; J. Andrew Kouzelos; Rachel S. Gabor; Hufsa Ahmad; Victoria Gunderson; Aaron C. Jacobs; Robert J. Cave; Hal Van Ryswyk. Electronic coupling in metalloporphyrin dimers. Presented at the 237th American Chemical Society National Meeting, Salt Lake City, UT, United States, Mar 23, 2009.

Nancy D. Eisenmenger; Amanda Hickman; Trevor A. McQueen; Ryan J. Pakula; Steven C. Pankratz; Tarun C. Narayan; **Glennis E. Rayermann;** Rebecca A. Jensen; Joseph T. Hupp; Robert J. Cave; Hal Van Ryswyk. Metalloporphyrins: intramolecular coupling and injection efficiency on zinc oxide nanotube photoanodes. Presented at the Gordon Research Conference on Renewable Energy: Solar Fuels, Ventura, CA, United States, Jan 31 - Feb 1, 2009.

Jeffrey D. Groves; Alex Hagen; **Glennis E. Rayermann.** The Mechanics of the Columbian Press. Presented at the American Printing History Association Conference, University of California Los Angeles, CA, United States, Oct 12, 2007.

LABORATORY MANAGEMENT & SUPERVISORY ROLES

Student Research Supervisor, University of Washington, Seattle, WA

Sep 2011 – May 2012

Supervised and managed a UW undergraduate researcher. Provided instruction in sample preparation, instrument use, and data processing. Trained student how to present and discuss research results. Guided student's development as an independent researcher. Co-authored journal article with student in *Journal of Physical Chemistry B*.

Safety Coordinator, University of Washington, Seattle, WA

Spring 2011 – Spring 2012

Oversaw and managed the chemical hygiene and safety in the Ginger Lab and Photonics Research Center, a multi-user shared instrumentation and equipment facility. Performed regular safety audits and enforced compliance with Environmental, Health, and Safety rules and regulations. Ensured all Photonics Research Center users, which encompassed >10 independent groups, had proper safety training.

Multi-Group Research Meeting Coordinator, University of Washington, Seattle, WA

Fall 2011 – Spring 2012

One of two organizers of regular interdepartmental, interdisciplinary multi-group meetings about solar energy research. Meetings occurred once every two weeks with 30-50 attendees from eight research labs. Responsible for logistics such as scheduling speakers and conference rooms.

Visiting Scholar Host, University of Washington, Seattle, WA

May 9 – 27, 2011

Planned experiments, organized sample delivery across international borders, coordinated access to instrumentation and supplies, and collaborated on experiments.

Research Experiences for Undergraduates (REU) Student Supervisor, University of Washington, Seattle, WA

Summer 2011

Supervised and managed an REU student. Provided training in sample preparation, instrument use and theory, and data processing. Taught student how to present and discuss research results. Oversaw creation of research poster for professional conference.

PUBLIC COMMUNICATION

PRESS RELEASES & SOCIAL MEDIA

Co-wrote initial pitches and aided in editing press releases about my 2017 *Biophysical Journal* article for:

- Physics Today 71, 2, 21 (2018) | <https://doi.org/10.1063/PT.3.3838>

- UW News (Dec 5, 2017) | <http://www.washington.edu/news/2017/12/05/>

Artrageous with Nate webisode "Art Forgery Forensics: How to Spot a Fake Painting," Indianapolis Museum of Art at Newfields, Indianapolis, IN • Jul 12, 2017 | <https://www.youtube.com/watch?v=KA5Kr1qhS9g>

COMMUNITY SERVICE & OUTREACH

Society for Advancement of Chicanos/Hispanics and Native Americans in Science Native Scholars on the Rise
UW Mentorship Day Mentor • May 7, 2018

Women in STEM Classroom Walk IN, Cold Spring School, Indianapolis, IN • Apr 14, 2017

Science Fair Judge, Seattle Public Schools (7th and 8th grade), Museum of Flight, Seattle, WA • Jun 2015 & 2016

Undergraduate Chemistry Club Graduate School Panelist • Apr 26, 2016

University of Washington Husky Fest solar energy booth, Seattle, WA • Apr 20, 2012
NSF solar energy booth, AAAS Conference, Vancouver, BC, Canada • Feb 16 – 19, 2012
Shoreline SolarFest, Shoreline Community College, Shoreline, WA • Jul 16, 2011
Photovoltaics Industry Reception at the IEEE meeting, Seattle, WA • Jun 22, 2011
A New Dawn for Solar Energy Poster Reception, University of Washington, Seattle, WA • Apr 12, 2011
Paws On Science, Pacific Science Center, Seattle, WA • Apr 9-10, 2011
Science Fair Judge, Lake Washington Girls Middle School, Seattle, WA • Feb 16, 2011

PROFESSIONAL DEVELOPMENT

CONSERVATION

Toured the conservation science facilities at:

- The Tate Modern, London, England • Mar 22, 2018
- The Smithsonian's Museum Conservation Institute, Suitland, MD • Jan 5, 2018
- The National Gallery of Art, Washington, DC • Jan 4, 2018
- The Art Institute of Chicago, Chicago, IL • May 12, 2017
- The Getty Museum's Conservation Institute, Los Angeles, CA • Spring 2007

Acquired hands-on experience with objects conservator Linda Roundhill, Woodinville, WA • Jul – Oct 2016

Attended the "Scientific Methods in Cultural Heritage Research" Gordon Research Seminar and Conference, Newry, ME • Jul 31 – Aug 5, 2016

Attended the 2013 Western Association for Art Conservation meeting, Seattle Art Museum • Sep 18, 2013

Met with Nick Dorman, Chief Conservator at the Seattle Art Museum • Sep 11, 2013

Participated in the American Chemical Society's "Alternative Careers: Chemistry and the Art Detective" webinar • Aug 1, 2013

CONFERENCES, COURSES, & WORKSHOPS

University of Washington Data Science Summit (including deep learning tutorial) • Apr 3-4, 2018

University of Washington Software Carpentry Python Workshop • Jun 14 – 15, 2016

Biophysical Society 60th Annual Meeting, Los Angeles, CA • Feb 27 – Mar 2, 2016

2011 Center for Nanophase Materials Sciences User Meeting, Oak Ridge National Laboratory, Oak Ridge, TN • Sep 19 – 23, 2011

Machine Shop Instruction Course, University of Washington • Fall 2010

FOREIGN LANGUAGE

French | high proficiency (reading, speaking, writing)

Eight years of formal study. During undergraduate semester in Paris, took all courses, including inorganic chemistry lecture and lab, in French. Translated chapters in *L'art d'imiter* on scientific analysis of fake artworks for my IMA research project.

PROFESSIONAL AFFILIATIONS

Member, Biophysical Society of Canada • 2018 – present

Member, American Institute for Conservation • 2017 – present

Member, Biophysical Society • 2015 – present

Member, American Chemical Society • 2009 – 2013

TEACHING EXPERIENCE

Teaching Assistant, Department of Chemistry, University of Washington, Seattle, WA

Spring 2018 | Fall 2017 | Winter & Spring 2011 | Winter 2010 | Fall 2009

Administered supplementary instruction during quiz sections and office hours. Supervised and taught general chemistry labs. Created exam questions for 400-level chemistry courses. Wrote and delivered one lecture of undergraduate quantum chemistry.

Tutor, Academic Excellence, Harvey Mudd College, Claremont, CA

Spring Semester 2009

Tutored freshman students in general chemistry. Administered homework help and exam review.

Lead Lab Preceptor, Department of Chemistry, Harvey Mudd College, Claremont, CA

Fall Semesters 2006, 2008

Trained undergraduate students in appropriate sampling technique. Oversaw undergraduates as they delivered lessons to and took soil samples with elementary students at local elementary schools.

Introductory Chemistry Lab Assistant, Harvey Mudd College, Claremont, CA

Fall Semester 2007

Graded pre-lab assignments, monitored experimental work, and aided students with lab reports.

REFERENCES

Sarah L. Keller, Ph.D.

Professor of Chemistry and Adjunct Professor of Physics

University of Washington

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Gregory D. Smith, Ph.D.

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