Hannah K. Wayment-Steele

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Education

Ph.D. Candidate in Chemistry, Stanford University — Anticipated 2021
Concentration in Chemical Physics
Supervisor: Vijay S. Pande

M.Phil. in Chemistry, University of Cambridge — September 2016
Supervisor: Daan Frenkel
Funded by the Churchill Scholarship
Thesis: Investigating the Role of Boundary Bricks in DNA Brick Assembly via Monte Carlo Simulation

B.A., Pomona College — May 2015
Chemistry and Applied Mathematics (Double Major), Minor in Music
GPA: 3.93, Magna cum Laude
Chemistry Thesis: Investigating the Effect of Al^{3+} on Lipid Bilayers: Experimental and Simulation Studies
Mathematics Thesis: A Stochastic Differential Equations Model for Microtubule Dynamics in Early *C. Elegans* Development

Scholarships & Awards

NSF Graduate Research Fellowship	April 2016
Churchill Scholar	January 2015
Beckman Scholar	April 2014
Goldwater Scholar	March 2014
ACS Colloid & Surface Chemistry Division Poster Award	March 2014
National Merit Scholar	March 2011
Siemens Award for Advanced Placement	February 2011

Awarded by Pomona College

John Stauffer Prize for Academic Merit in the Sciences — May 2015
– *Awarded to one senior annually in the natural sciences who exhibits the highest academic promise.*
Philip Goldberg Memorial Prize — May 2015
– *Awarded to one student annually for outstanding musical performance.*
Brackett Prize in Chemistry — May 2015
Tileston Physics Prize — August 2014
Llewellyn Bixby Prize in Mathematics — May 2013
Pomona College Scholar (top 25% of class) — Fall 2011 to May 2015

Peer Reviewed Publications

H. K. Wayment-Steele, D. Frenkel, A. Reinhardt. "Investigating the role of boundary bricks in DNA brick self-assembly." Soft Matter (2017) 13, 1670-1680.

B. Agnarsson, H. K. Wayment-Steele, F. Höök, A. Kunze. "Monitoring of single and double lipid membrane formation with high spatiotemporal resolution using evanescent light scattering microscopy." Nanoscale (2016) 8, 19219-19223.

H. K. Wayment-Steele, Y. Jing, M. J. Swann, L. E. Johnson, B. Agnarsson, M. S. Johal, A. Kunze. "Effects of Al^{3+} on phosphocholine and phosphoglycerol containing solid supported lipid bilayers." Langmuir (2016) 32:7, 17711781.

H. K. Wayment-Steele, L. E. Johnson, F. Tian, M. C. Dixon, L. Benz and M. S. Johal. "Monitoring N3 Dye Adsorption and Desorption on TiO_2 Surfaces: A Combined QCM-D and XPS Study." ACS Applied Materials & Interfaces (2014) 6, 9093-9099.

F. Tian, A. M. Cerro, A. M. Mosier, H. K. Wayment-Steele, R. S. Shine, A. Park, E. R. Webster, L. E. Johnson, M. S. Johal and L. Benz. "Surface and Stability Characterization of a Nanoporous ZIF-8 Thin Film." The Journal of Physical Chemistry C (2014) 118, 14449-14456.

Workshops

MolSim: Advanced Molecular Simulation — January 2016
2 week course on advanced molecular simulation techniques in Monte Carlo and Molecular Dynamics.
Amsterdam, Netherlands

Telluride School of Theoretical Chemistry — July 2015
1 week course on quantum mechanics, statistical mechanics, and chemical dynamics.
Telluride, CO

Research Experience

Pande Group — September 2016 to present
Department of Chemistry, Stanford University
- Studying the effect of sequence in ensembles of intrinsically disordered proteins (IDPs).
- Developing metadynamics techniques for accelerated sampling in conjunction with experiment.

Frenkel Group — September 2015 to September 2016
Department of Chemistry, University of Cambridge
- Performed Monte Carlo simulations of self-assembling DNA strands with the intent of understanding kinetic traps and nucleation pathways in addressable self-assembly.
- Developed code implementing the Grand Canonical ensemble for the above system.

Johal Group — January 2012 to present
Pomona College Chemistry Department
- Developed and performed experiments to characterize dye adsorption to semiconductors for applications in Dye-Sensitized Solar Cells.
- Conducted Molecular Dynamics simulations of metal ions and lipid membranes in GROMACS.
- Collaborated on a series of experiments to characterize the physical properties of ZIF-8 nanoparticles immobilized on silicon and gold surfaces.
- Mentored other undergraduate researchers on projects related to effects of metal ions on lipid membranes, adsorption of organic dyes for photovoltaics, and effects of anti-microbial peptides on lipid membranes.

Biological Physics Department — May-July 2013 and 2014
Chalmers Institute of Technology, Gothenburg, Sweden
- Developed and performed experiments to investigate the effects of Ca^{2+}, Mg^{2+}, and Al^{3+} on physical properties of model lipid membranes using techniques including Quartz Crystal Microbalance with Dissipation Monitoring (QCM-D), Dual Polarization Interferometry (DPI), and Fluorescence Recovery after Photobleaching (FRAP).
- Advised other researchers on QCM-D experiments investigating ion-membrane interactions.

Teaching Experience

Teaching Assistant: Physical Chemistry I Spring 2017
Bianxiao Cui, Department of Chemistry, Stanford University
- Assisted in developing and running weekly discussion sections and office hours.
- Helped write and grade homeworks, midterms, exams.

Teaching Assistant: Physical Chemistry III Winter 2017
Tom Markland, Department of Chemistry, Stanford University
- Developed material to aid understanding in weekly discussion sections and gave lectures.
- Helped develop and grade homeworks, midterms, exams.

Teaching Assistant: Accelerated Chemical Principles Fall 2016
W.E. Moerner, Charles Cox, Department of Chemistry, Stanford University
- Supervised weekly laboratory sections and office hours.
- Helped develop laboratory section materials and exam questions.

Practical Supervisor Fall 2015
NanoDTC, Cavendish Laboratory, Cambridge
- Met weekly with first-year PhD students to supervise a practical in Monte Carlo simulation of DNA brick self-assembly.
- Developed course handouts and code for data analysis.

Laboratory Assistant: Physical Chemistry –Thermodynamics Spring 2015
Mukesh Arora, Pomona College Chemistry Department
- Taught and supervised students in calorimetry lab experiments.
- Aided in laboratory setup and coursework development.

Teaching Assistant: Physical Chemistry for Molecular Biology Spring 2015
Malkiat Johal, Pomona College Chemistry Department
- Ran office hours in Thermodynamics and Quantum Mechanics applied to biology.

Teaching Assistant: Differential Equations Spring 2014
Dashiel Fryer, Pomona College Math Department
- Met with students twice a week for four hours to help with homework, discuss topics in differential equations, and prepare for exams.

Teaching Assistant: Physical Chemistry –Quantum Mechanics Fall 2014
Malkiat Johal, Pomona College Chemistry Department
- Ran office hours in Quantum Mechanics and Spectroscopy.

Grader: Linear Algebra Fall 2012
Shahriar Shahriari, Pomona College Math Department
- Graded problem sets once a week for 40 students, reviewed students work and gave constructive feedback.

Memberships

Phi Beta Kappa	April 2015
Mortar Board	April 2014
Sigma Xi Scientific Research Society	August 2013
National Society of Collegiate Scholars	April 2013
SPIE Student Member	February 2013
American Chemical Society Student Member	March 2012

Oral Presentations

H. K. Wayment-Steele (presenting). "Effects of Al^{3+} on Supported Lipid Membranes." DPI/QCM-D User Meeting, Manchester, UK, 10/26/2015.

H. K. Wayment-Steele (presenting). "Investigating Effects of Al^{3+} on Structure and Fluidity of Lipid Membranes: FRAP and Molecular Dynamics." American Chemical Society National Conference, Denver, CO, 3/22/2015.

H. K. Wayment-Steele (presenting). "Investigating Effects of Al^{3+} on Lipid Membranes: FRAP and Molecular Dynamics." Presentation to Janshoff Research Group, Biophysical Chemistry Department, Georg-August-Universität Göttingen. Göttingen, Germany, 6/26/2014.

H. K. Wayment-Steele (presenting), L. E. Johnson, M. C. Dixon, M. S. Johal. "Investigating Reversible Dye Adsorption on TiO_2," AVS International Symposium & Exhibition, Long Beach, CA, 10/30/2013.

H. K. Wayment-Steele (presenting), L. E. Johnson, M. C. Dixon, M. S. Johal. "Characterization of N3 Dye Adsorption on TiO_2 using QCM-D," SPIE Solar Energy & Technology conference, San Diego, CA, 8/25/2013.

Poster Presentations

H. K. Wayment-Steele, L. E. Johnson, S. Svedhem, M. S. Johal, B. Kasemo, A. Kunze. "Investigating Effects of Al^{3+} on Lipid Bilayer Structure," International Symposium on Biomathematics and Ecology: Education and Research, Claremont, CA, 10/09/2014.

H. K. Wayment-Steele, L. E. Johnson, S. Svedhem, M. S. Johal, B. Kasemo, A. Kunze. "Investigating Effects of Al^{3+} on Lipid Membranes: FRAP and Molecular Dynamics," International Conference on Nanoscience and Technology, American Vacuum Society, 7/20/2014.

H. K. Wayment-Steele A. Kunze, L. E. Johnson, M. S. Johal, S. Svedhem. "QCM-D and MD Study of Al^{3+} Effects on Membrane Structure," American Chemical Society National Meeting, Dallas, TX, 4/16/2014.
Poster Award, ACS Colloids and Surface Chemistry Division

H. K. Wayment-Steele, L. E. Johnson, M. C. Dixon, M. S. Johal. "QCM-D Characterization of N3 Dye Adsorption to TiO_2," American Chemical Society National Meeting, New Orleans, LA, 4/20/2013.

Conference Proceedings

H. K. Wayment-Steele, S. Svedhem, L. E. Johnson, M. S. Johal, B. Agnarsson, and A. Kunze (presenting). "Al^{3+} binding effects on lipid membrane structure" German Physical Society Annual Meeting, Berlin, Germany, 3/18/2015.

M. C. Dixon (presenting), H. K. Wayment-Steele, L. E. Johnson, F. Tian, L. Benz, and M. S. Johal. "Fundamental Dye Self-assembly and Removal Studies". Smart Coatings Conference, Orlando, FL, 2/25/2015.

B. Agnarsson, H. K. Wayment-Steele, S. Svedhem, F. Höök, B. Kasemo, and A. Kunze (presenting). "Ion-mediated formation of a double lipid membrane." German Biophysical Society Annual Meeting, Lübeck, Germany, 9/14/2014.

H. K. Wayment-Steele, L. E. Johnson, M. C. Dixon, M. S. Johal. (2013, September 13). "Characterization of N3 Dye Adsorption on TiO_2 using Quartz-Crystal Microbalance with Dissipation

Monitoring." In L. Eldada, M. Heben (Eds.) *SPIE Proceedings Vol. 8823.* Paper Presented at SPIE Optics & Photonics: Thin Film Solar Technology V, San Diego, 25-29 August.

Science Writing Publications

H. K. Wayment-Steele, "The *Wunderkammer*: The Dawn of Curiosity in Europe", Cambridge University BlueSci Magazine (2016) 35, 30-31.

Contributed regular science news briefs for Cambridge University BlueSci Magazine, October 2015 to August 2016, www.bluesci.co.uk.

H. K. Wayment-Steele, L.E. Johnson, M.S. Johal, Solutions manual for *Understanding Nanomaterials*, in preparation.

Science Outreach Experience

Member of organization commitee June 2017
Protein Folding Consortium Workshop, Berkeley, CA

Head Student Liaison August 2013 to June 2015
Pomona College Chemistry Department

- Invited and hosted my international research collaborators as visiting speakers to share research with the Pomona community, meet students, and build relationships with faculty.
- Assisted in hosting candidates during faculty searches.
- Helped plan and organize events for chemistry students at Pomona, contacted outside offices and distributed information to chemistry majors regarding mentoring, course selection, etc.

Tutor in Computational Chemistry Spring 2015
Met weekly with first-year students to teach them principles of Computational Chemistry and introduce them to Molecular Dynamics Research. Developed lesson plans, homework assignments, and readings.

Co-President, Food Science Club May 2014 to June 2015
Helped plan and organize events to excite and educate the Pomona College community about the science of food, taste, cooking, and wine making, including monthly cooking sessions, discussions, and experiments based on chemical and biochemical principles.

Pomona College represenative February 2014
Selected to present my research to HRH Princess Maha Chakri Sirindhorn of Thailand, one of three students to receive the honor.

Assistant organizer October 2014
International Symposium on Biomathematics and Ecology, Claremont, CA

Other Experience

Member, Pomona-Pitzer Varsity Volleyball Team 2011-12, 2012-13 seasons

- Participated in daily practice during season and travel to DIII SCIAC conference matches in season, maintained off-season training schedule, helped organize and run Pomona Athletic Department events.

Piano Instructor May 2012 to May 2013
Pomona Valley Music Mentors Program

- Met with underprivileged students in elementary school once a week to teach piano, including technique, basic music theory, and music history.

Extracurricular Awards

Pomona-Pitzer Varsity Volleyball Team Member	2011-12, 2012-13 seasons
Female Athlete of the Year, Northland Preparatory Academy	May 2011
Dairymens All-American Volleyball Team (State of Arizona)	February 2011
Arizona runner-up, MTNA National Piano Competition	November 2010