

Kara D. Fong

✉ karafong@caltech.edu

Professional Appointments

California Institute of Technology

ASSISTANT PROFESSOR OF CHEMICAL ENGINEERING
WILLIAM H. HURT SCHOLAR

Pasadena, CA

2025–Present

2026–Present

University of Cambridge

SCHMIDT SCIENCE FELLOW
JUNIOR RESEARCH FELLOW IN TRINITY COLLEGE

Cambridge, UK

2022–2024

2022–2025

Advisors: Clare Grey, Angelos Michaelides

Education

University of California, Berkeley

PH.D. CHEMICAL ENGINEERING, GPA 4.00/4.00

Advisors: Kristin Persson, Bryan McCloskey

Thesis: “Ion Correlations and Transport in Li-Ion Battery Electrolytes”

Berkeley, CA

2017–2022

University of Cambridge

M.PHIL. MATERIALS SCIENCE AND METALLURGY

Advisor: Stoyan Smoukov

Thesis: “Interpenetrated Electron/Ion Conducting Polymer Networks for Enhanced Supercapacitor Electrodes”

Cambridge, UK

2016–2017

Stanford University

B.S. CHEMICAL ENGINEERING WITH HONORS AND DISTINCTION, GPA 4.18/4.00

Advisor: Thomas Jaramillo

Thesis: “Improving Intrinsic Activity Measurements for Hydrogen Evolution Electrocatalysts with Application to Transition Metal Phosphides”

Stanford, CA

2012–2016

Awards & Honors

RESEARCH

2026	Royal Society of Chemistry Faraday Horizon Prize
2026	William H. Hurt Scholarship California Institute of Technology
2025	Electrochemical Society Early Career Travel Grant
2025	Scialog Fellow Sustainable Minerals, Metals, and Materials
2024	Early Career Researcher Travel Award Supergen Energy Networks Hub
2022 – 2024	Schmidt Science Fellowship
2022 – 2026	Junior Research Fellowship Trinity College, University of Cambridge
2022	Junior Research Fellowship Sidney Sussex College, University of Cambridge (<i>declined</i>)
2022	Stanford Science Fellowship (<i>declined</i>)
2021	Rising Star in Chemical Engineering Massachusetts Institute of Technology
2020 – 2022	Berkeley Fellowship for Graduate Study University of California, Berkeley
2019	First Place in Materials Engineering and Sciences Division Poster Competition AIChE
2019	Women in Chemical Engineering (WIC) Travel Award AIChE
2017 – 2020	National Science Foundation Graduate Research Fellowship
2016 – 2017	Churchill Scholarship
2016	Firestone Medal for Excellence in Undergraduate Research Stanford University
2015	Merck Award for Student Research Stanford University
2014	RISE Scholarship Deutscher Akademischer Austausch Dienst
2013	Undergraduate Advising and Research (UAR) Major Grant Stanford University

TEACHING

2019, 2020 Outstanding Graduate Student Instructor | University of California, Berkeley

ACADEMIC

2016 Henry Ford II Scholar | Stanford University (*highest GPA in the College of Engineering*)
2016 The Deans' Award for Academic Achievement | Stanford University
2016 Mason and Marsden Prize in Chemical Engineering | Stanford University
2016 Frederick Emmons Terman Engineering Scholastic Award | Stanford University
2015 The Channing Robertson Award in Chemical Engineering | Stanford University
2015 Tau Beta Pi Engineering Honor Society
2015 Phi Beta Kappa Honor Society
2014 Barry Goldwater Scholarship in Mathematics, Science, and Engineering
2013 President's Award for Academic Excellence in the Freshman Year | Stanford University
2013 Boothe Prize for Excellence in Writing, Honorable Mention | Stanford University

Publications

Google Scholar

Since starting at Caltech

1. S.G.H. Brookes, I.C. Popoola, F. Berger, **K.D. Fong**, A. Michaelides,* , C. Schran.* "Breaking Water at Graphene Defects." arXiv preprint, 2026, arXiv:2609.11602.
2. **K.D. Fong**,* Z.-G. Wang.* "Spread-charge model for electric double layers." *Journal of Chemical Physics*, 2026.
3. X.R. Advincula, Y. Litman, **K.D. Fong**, W.C. Witt, C. Schran,* A. Michaelides.* "How reactive is water at the nanoscale and how to control it?" *Science Advances*, 2026, 12, 6: eaeb5772.
4. M.A. Murphy, **K.D. Fong*** "Beyond Interfacial Structure: Ion Transport Mediates Cation Effects in Electrochemical Nitrate Reduction." *ACS Electrochemistry*, 2026, 2, 4: 983–994.
5. X.R. Advincula, **K.D. Fong**, Y. Wang, C. Schran, M. Bonn, A. Michaelides,* Y. Litman.* "Breaking the Air-Water Paradigm: Ion Behavior at Hydrophobic Solid-Water Interfaces." *Journal of the American Chemical Society*, 2026, 148, 12: 12753–12763.
6. I.J. Parker, M.J. Hoffmann, W.J. Baldwin,* S. Han, S. Gupta, **K.D. Fong**, A. Michaelides, C. Schran,* S. De, G. Csanyi. "False Metallization in Short-Ranged Machine Learned Interatomic Potentials." arXiv preprint, 2026, arXiv:2603.04228.
7. X. Liu, **K.D. Fong**, W. Yu, H. Nishihara, C.P. Grey,* A.C. Forse.* "Electrolyte Effects on Disorder-enhanced Capacitance in Nanoporous Carbons." *ACS Electrochemistry*, 2026, 2, 2: 510–518.
8. **K.D. Fong*** "From Solvation Shells to Power Cells." *Nature Chemical Engineering*, 2025, 2, 771.

INVITED "BY THE NUMBERS" ARTICLE

Before Caltech

9. S.J. Shin,* **K.D. Fong**, A. Walsh. "Constant Potential Electrochemistry with Multiscale Quantum Mechanical / Machine Learning Simulations." ChemRxiv preprint, 2025, 10.26434/chemrxiv-2025-x4s5b.
10. Y. Wang, H. Luo, X.R. Advincula, Z. Zhao, A. Esfandiari, D. Wu, **K.D. Fong**, L. Gao, A.S. Hazrah, T. Taniguchi, C. Schran, Y. Nagata, L. Bocquet, M.L. Bocquet, Y. Jiang, A. Michaelides, M. Bonn.* "Spontaneous Surface Charging and Janus Nature of the Hexagonal Boron Nitride-Water Interface." *Journal of the American Chemical Society*, 2025, 147, 33: 30107–30116.
11. X.R. Advincula, **K.D. Fong***, A. Michaelides,* C. Schran.* "Protons accumulate at the graphene-water interface." *ACS Nano*, 2025, 19, 18: 17728–17737.
12. **K.D. Fong**,* C.P. Grey,* A. Michaelides.* "On the physical origins of reduced ionic conductivity in nanoconfined electrolytes." *ACS Nano*, 2025, 19, 13: 13191–13201.
13. N. O'Neill, B.X. Shi, **K.D. Fong**, A. Michaelides,* C. Schran.* "To pair or not to pair? Machine-learned explicitly-correlated electronic structure for NaCl in water." *The Journal of Physical Chemistry Letters*, 2024, 15: 6081–6091.
14. **K.D. Fong**,* B. Sumić, N. O'Neill, C. Schran, C.P. Grey,* Angelos Michaelides.* "The Interplay of Solvation and Polarization Effects on Ion Pairing in Nanoconfined Electrolytes." *Nano Letters*, 2024, 24, 16: 5024–5030.
15. O. A. Cohen, H. Macdermott-Opeskin, L. Lee, T. Hou, **K. D. Fong**, R. Kingsbury, J. Wang, K. A. Persson.* "SolvationAnalysis: A Python Toolkit for Understanding Liquid Solvation Structure in Classical Molecular Dynamics Simulations." *The Journal of Open Source Software*, 2023, 8, 84: 5183.

16. H. K. Bergstrom, **K. D. Fong**, D. Halat, C. A. Karouta, H. C. Celik, J. A. Reimer, B. D. McCloskey.* "Ion correlation and negative lithium transference in polyelectrolyte solutions." *Chemical Science*, 2023, 14, 24: 6546-6557.
 17. P. K. Jones, **K. D. Fong**, K. A. Persson, A. A. Lee.* "Inferring Global Dynamics from Local Structure in Liquid Electrolytes." *arXiv preprint*, 2022, arXiv:2208.03182.
 18. J. Cheng, **K. D. Fong**, K. A. Persson.* "Materials design principles of amorphous cathode coatings for lithium-ion battery applications." *Journal of Materials Chemistry A*, 2022, 10:22245-56.
 19. J. Self, H. K. Bergstrom, **K. D. Fong**, B. D. McCloskey, K. A. Persson.* "A Theoretical Model for Computing Freezing Point Depression of Lithium-Ion Battery Electrolytes." *Journal of the Electrochemical Society*, 2021, 168: 120532.
 20. T. Hou, **K. D. Fong**, J. Wang, K. A. Persson.* "The Solvation Structure, Transport Properties and Reduction Behavior of Carbonate-Based Electrolytes of Lithium-Ion Batteries." *Chemical Science*, 2021, 12, 44: 14740-14751.
 21. A. J. Ringsby, **K. D. Fong**, J. Self, H. K. Bergstrom, B. D. McCloskey,* K. A. Persson.* "Transport Phenomena in Low Temperature Lithium-Ion Battery Electrolytes." *Journal of the Electrochemical Society*, 2021, 168: 080501.
- IOP PUBLISHING TOP CITED PAPER AWARD NORTH AMERICA**
22. H. K. Bergstrom, **K. D. Fong**, B. D. McCloskey.* "Interfacial Effects on Transport Coefficient Measurements in Li-ion Battery Electrolytes." *Journal of the Electrochemical Society*, 2021, 168: 060543.
 23. **K. D. Fong**, J. Self, B. D. McCloskey,* K. A. Persson.* "Ion Correlations and Their Impact on Transport in Polymer-Based Electrolytes." *Macromolecules*, 2021, 54, 6: 2575-2591.
- SELECTED AS ACS EDITOR'S CHOICE
FEATURED ON FRONT COVER OF ISSUE**
24. **K. D. Fong**, J. Self, B. D. McCloskey,* K. A. Persson.* "Onsager Transport Coefficients and Transference Numbers in Polyelectrolyte Solutions and Polymerized Ionic Liquids." *Macromolecules*, 2020, 53, 21: 9503-9512.
 25. **K. D. Fong**, H. K. Bergstrom, B. D. McCloskey, K. K. Mandadapu.* "Transport Phenomena in Electrolyte Solutions: Non-Equilibrium Thermodynamics and Statistical Mechanics." *AIChE Journal*, 2020, 66, 12: e17091.
 26. J. Self, N. T. Hahn, **K. D. Fong**, S. A. McClary, K. R. Zavadil, K. A. Persson.* "Ion Pairing and Redissociation in Low-Permittivity Electrolytes for Multivalent Battery Applications." *The Journal of Physical Chemistry Letters*, 2020, 11, 6: 2046-2052.
 27. J. Self, **K. D. Fong**, K. A. Persson.* "Transport in Superconcentrated LiPF₆ and LiBF₄/Propylene Carbonate Electrolytes." *ACS Energy Letters*, 2019, 4: 2843-2849.
 28. J. Self, **K. D. Fong**, E. R. Logan, K. A. Persson.* "Ion Association Constants for Lithium Ion Battery Electrolytes from First Principles Quantum Chemistry." *Journal of the Electrochemical Society*, 2019, 166: A3554-A3558.
 29. **K. D. Fong**, J. Self, K. M. Diederichsen, B. M. Wood, B. D. McCloskey,* K. A. Persson.* "Ion Transport and the True Transference Number in Nonaqueous Polyelectrolyte Solutions for Lithium-Ion Batteries." *ACS Central Science*, 2019, 5: 1250-1260.
 30. K. M. Diederichsen, **K. D. Fong**, R. C. Terrell, K. A. Persson, B. D. McCloskey.* "Investigation of Solvent Type and Salt Addition in High Transference Number Nonaqueous Polyelectrolyte Solutions for Lithium Ion Batteries." *Macromolecules*, 2018, 51: 8761-8771.
 31. T. Wang, H.-K. Kim, Y. Liu, W. Li, J. T. Griffiths, Y. Wu, S. Laha, **K. D. Fong**, F. Podjaski, C. Yun, R. V. Kumar, B. V. Lotsch, A. K. Cheetham, S. K. Smoukov.* "Bottom-up Formation of Carbon-Based Structures with Multilevel Hierarchy from MOF-Guest Polyhedra." *Journal of the American Chemical Society*, 2018, 140: 6130-6136.
 32. **K. D. Fong**, T. Wang, S. K. Smoukov.* "Multi-Dimensional Performance Optimization of Conducting Polymer-Based Supercapacitor Electrodes." *Sustainable Energy and Fuels*, 2017, 1: 1857-1874.
 33. **K. D. Fong**,[†] T. Wang,[†] H.-K. Kim, R. V. Kumar, S. K. Smoukov.* "Semi-Interpenetrating Polymer Networks for Enhanced Supercapacitor Electrodes." *ACS Energy Letters*, 2017, 2: 2014-2020.
 34. T. L. Sirich,* **K. D. Fong**, B. Larive, G. J. Beck, G. M. Chertow, N. W. Levin, A. S. Kliger, N. S. Plummer, T. W. Meyer. "Limited Reduction in Uremic Solute Concentrations with Increased Dialysis Frequency and Time in the Frequent Hemodialysis Network Daily Trial." *Kidney International*, 2017, 91: 1186-1192.
 35. J. W. F. To, J. W. D. Ng, S. Siahrostami, A. L. Koh, Y. Lee, Z. Chen, **K. D. Fong**, S. Chen, J. He, W.-G. Bae, J. Wilcox, H. Y. Jeong, K. Kim, F. Studt,* J. K. Nørskov,* T. F. Jaramillo,* Z. Bao.* "High-performance Oxygen Reduction and Evolution Carbon Catalysis: From Mechanistic Studies to Device Integration." *Nano Research*, 2016, 10: 1163-1177.
 36. F. J. O'Brien, **K. D. Fong**, T. L. Sirich, T. W. Meyer.* "More Dialysis Has Not Proven Much Better." *Seminars in Dialysis*, 2016, 29: 481-490.
 37. T.M. Meyer,* T.L. Sirich, **K. D. Fong**, N.S. Plummer, T. Shafi, S. Hwan, T. Banerjee, Y. Zhu, N.R. Powe, X. Hai, T.H. Hostetter. "Kt/V_{urea} and Nonurea Small Solute Levels in the Hemodialysis Study." *Journal of the American Society of Nephrology*, 2016, 27: 3469-3478.
 38. J.D. Benck, S.C. Lee, **K. D. Fong**, J. Kibsgaard, R. Sinclair, T.F. Jaramillo.* "Designing Active and Stable Silicon Photocathodes

Presentations

Invited Presentations

2026 Sep	KAIST-Caltech Joint Workshop on Molecular Science and Chemical Innovation, Daejeon, South Korea
2026 Jun	20th U.S. National Congress on Theoretical and Applied Mechanics, Pasadena, CA
2026 May	Center for Materials for Water and Energy Systems (virtual)
2026 Mar	American Chemical Society Spring Meeting, Atlanta, GA
2026 Feb	Mesilla Chemistry Workshop, Mesilla, NM
2026 Feb	California State University, Long Beach, Department of Chemistry and Biochemistry, Long Beach, CA
2025 Oct	248th Electrochemical Society Meeting, Chicago, IL
2025 Sep	SOIL Workshop, California Institute of Technology, Pasadena, CA
2025 Sep	CGSC Summer Seminar Series, California Institute of Technology, Pasadena, CA
2025 Apr	Energy Storage Research Alliance (virtual)
2024 Nov	School of Natural and Environmental Sciences, Newcastle University, Newcastle upon Tyne, UK
2024 May	Yusuf Hamied Department of Chemistry, University of Cambridge, Cambridge, UK
2023 Dec	INSTA QT Workshop on Technology Developments, University of Sussex (virtual)
2023 Mar	Oxford Battery Modelling Symposium, Oxford, UK
2023 Mar	Cambridge Zero Discovery Science Workshop, Cambridge, UK
2022 Mar	American Physical Society March Meeting (Padden Award Symposium), Chicago, IL
2022 Mar	University of Michigan, Department of Chemical Engineering, Ann Arbor, MI
2022 Feb	California Institute of Technology, Division of Chemistry and Chemical Engineering, Pasadena, CA
2022 Feb	Massachusetts Institute of Technology, Department of Chemical Engineering, Cambridge, MA
2022 Feb	University of Colorado, Boulder, Department of Chemical and Biological Engineering, Boulder, CO
2022 Jan	University of California, Santa Barbara, Department of Chemical Engineering, Santa Barbara, CA
2022 Jan	Princeton University, Department of Chemical and Biological Engineering (virtual)
2021 Nov	Lennard-Jones Centre, University of Cambridge (virtual)
2021 Nov	Young Investigator Lecture Series, Electrochemical Society San Francisco Section (virtual)
2021 Nov	Pitzer Center for Theoretical Chemistry, University of California, Berkeley, CA
2021 Aug	Stanford University, hosted by Tom Markland, Stanford, CA
2021 Jul	Drexel University, hosted by Maureen Tang (virtual)
2021 May	University of Cambridge, hosted by Clare Grey (virtual)
2021 Apr	Women Excelling in Computational Molecular Engineering Seminar Series (virtual)
2021 Mar	Lawrence Berkeley National Laboratory Electrochemistry Seminar (virtual)
2020 Oct	Battery Modeling Webinar Series (virtual)
2020 Apr	Lawrence Berkeley National Laboratory, hosted by Gerd Ceder (virtual)
2020 Jan	Berkeley Statistical Mechanics Meeting, Berkeley, CA

Contributed Presentations

2025 Nov	American Institute of Chemical Engineers Annual Meeting, Boston, MA (oral)
2024 Oct	American Institute of Chemical Engineers Annual Meeting, San Diego, CA (oral)
2023 Sep	The Inaugural Lennard-Jones Centre Meeting, Cambridge, UK (poster)
2021 Nov	American Institute of Chemical Engineers Annual Meeting, Boston, MA (oral)
2021 Nov	American Institute of Chemical Engineers Annual Meeting, Boston, MA (poster)
2020 Nov	American Institute of Chemical Engineers Annual Meeting (oral, virtual)
2020 Jun	American Society for Engineering Education (oral, virtual)
2020 Feb	Gordon Research Conference on Batteries, Ventura, CA (poster)
2019 Nov	American Institute of Chemical Engineers Annual Meeting, Orlando, FL (poster)

FIRST PLACE IN MATERIALS ENGINEERING AND SCIENCES DIVISION POSTER COMPETITION

2019 Mar	American Physical Society March Meeting, Boston, MA (oral)
2015 Aug	Stanford SUNCAT Summer Institute, Stanford, CA (poster)

2015 Mar American Chemical Society Spring Meeting, Denver, CO (oral)
 2015 Mar American Chemical Society Spring Meeting, Denver, CO (poster)
 2013 Nov American Institute of Chemical Engineers Annual Meeting, San Francisco, CA (poster)

Teaching Experience

California Institute of Technology

Pasadena, CA

INSTRUCTOR FOR HEAT TRANSPORT (CHE 103A)

Fall 2025

Average instructor rating: 4.9/5.0

Selected student evaluations:

- *Kara was very deeply engaged with the material and prioritized student engagement and understanding. This is one of the best classes I've had!*
- *Kara was one of the best professors I've had at this school. The class was hard, but in a good way, because it was attainable if you worked hard. She was always able to answer questions in a way that didn't make you feel stupid without oversimplifying. I'm really glad she has become part of the CCE faculty!*

University of Cambridge

Cambridge, UK

LECTURER, LENNARD-JONES CENTRE SUMMER SCHOOL

Sept. 2024

University of California, Berkeley

Berkeley, CA

CERTIFICATE IN TEACHING AND LEARNING IN HIGHER EDUCATION

Apr. 2021

INSTRUCTIONAL IMPROVEMENT PROJECT GRADUATE STUDENT ASSISTANT

May 2019 - Dec. 2019

- Professional Preparation: Teaching Chemical Engineering (CBE 375, a pedagogy course for graduate students)
- Collaborated with course instructor to redesign class content with greater emphasis on inclusive teaching and active learning strategies

GRADUATE STUDENT INSTRUCTOR

Jan. 2019 - May 2020

- Transport Processes (CBE 150A; Spring 2019, 2020)
- Awards: Outstanding Graduate Student Instructor (2019, 2020)

GUEST LECTURER

Aug. 2019 - Apr. 2021

- Professional Preparation: Teaching Chemical Engineering (CBE 375; 2019, 2020)
- Principles of Electrochemical Processes (CBE 176; Spring 2021)

Academic and Professional Service

Conference/Workshop Organization and Service

- Session Chair: AIChE Area 1E Tutorial Session on Electrochemical Methods 2026
- Organizer: Annual Meeting of the Marcus Center for Theoretical Chemistry at Caltech 2025, 2026
- Steering Group Member: Schmidt Science Fellows Interdisciplinary Science Summit 2025
- Session Organizer: Faraday Institution Conference 2024

Journal Reviewer

- *ACS Applied Materials & Interfaces, ACS Energy Letters, ACS Nano, Chemical Science, Chemistry of Materials, Energy & Environmental Materials, Journal of the American Chemical Society, Journal of Chemical Physics, Journal of Chemical Theory and Computation, Journal of The Electrochemical Society, Journal of Materials Chemistry A, Journal of Physical Chemistry Letters, Macromolecules, Materials Advances, Nature Communications, PNAS, Wiley-VCH books*

Proposal Reviewer

- President's and Director's Research and Development Fund | Caltech/JPL (2026)
- National Science Foundation CBET, review panelist (2025)
- Department of Energy BES, ad-hoc reviewer (2024, 2025)

Service at California Institute of Technology

- Graduate Admissions Committee | Chemical Engineering 2024-2025, 2025-2026
- Department Seminar Organizer | Chemical Engineering 2025-2026

Service at University of Cambridge

- Lennard-Jones Centre Council Nov. 2022 - May 2024

Service at University of California, Berkeley | Dept. of Chemical Engineering

- Graduate Student Advisory Committee May 2020 - May 2022
- Remote Teaching Committee Jun. 2020 - May 2021