

Kara D. Fong

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Professional Appointments

California Institute of Technology

(INCOMING) ASSISTANT PROFESSOR OF CHEMICAL ENGINEERING

Pasadena, CA

Starting Jan. 2025

University of Cambridge

SCHMIDT SCIENCE FELLOW

JUNIOR RESEARCH FELLOW IN TRINITY COLLEGE

Advisors: Clare Grey, Angelos Michaelides

Cambridge, UK

2022 - 2024

2022 - 2024

Education

University of California, Berkeley

PH.D. CHEMICAL ENGINEERING, GPA 4.00/4.00

Advisors: Kristin Persson, Bryan McCloskey, Kranthi Mandadapu

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

Scholarships & Fellowships

2022	Schmidt Science Fellowship
2022	Junior Research Fellowship Trinity College, University of Cambridge
2022	Stanford Science Fellowship (<i>declined</i>)
2020 - 2022	Berkeley Fellowship for Graduate Study University of California, Berkeley
2017 - 2020	National Science Foundation Graduate Research Fellowship
2016 - 2017	Churchill Scholarship
2014	Barry Goldwater Scholarship in Mathematics, Science, and Engineering
2014	RISE Scholarship Deutscher Akademischer Austausch Dienst
2013	Undergraduate Advising and Research (UAR) Major Grant Stanford University

Awards & Honors

2021	MIT Rising Star in Chemical Engineering
2019, 2020	Outstanding Graduate Student Instructor 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
2016	Henry Ford II Scholar Stanford University (<i>highest GPA in the College of Engineering</i>)
2016	Firestone Medal for Excellence in Undergraduate Research Stanford University
2016	Mason and Marsden Prize in Chemical Engineering Stanford University
2016	The Deans' Award for Academic Achievement Stanford University
2016	Frederick Emmons Terman Engineering Scholastic Award Stanford University
2015	Merck Award for Student Research Stanford University
2015	Tau Beta Pi Engineering Honor Society
2015	Phi Beta Kappa Honor Society
2015	The Channing Robertson Award in Chemical Engineering Stanford University
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

21. 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.
20. 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.
19. 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.
18. 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.
17. 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.
16. **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
15. **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.
14. **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.
13. J. Self, N. T. Hahn, **K. D. Fong**, S. A. McClary, K. R. Zavadil, and K. A. Persson. "Ion Pairing and Redissociation in Low-Permittivity Electrolytes for Multivalent Battery Applications." *J. Phys. Chem. Lett*, 2020, 11, 6: 2046-2052.
12. J. Self, **K. D. Fong**, and K. A. Persson. "Transport in Superconcentrated LiPF₆ and LiBF₄/Propylene Carbonate Electrolytes." *ACS Energy Letters*, 2019, 4: 2843-2849.
11. J. Self, **K. D. Fong**, E. R. Logan, and 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.
10. **K. D. Fong**, J. Self, K. M. Diederichsen, B. M. Wood, B. D. McCloskey, and 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.
9. K. M. Diederichsen, **K. D. Fong**, R. C. Terrell, K. A. Persson, and 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.
8. 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, and 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.
7. **K. D. Fong**, T. Wang, and S. K. Smoukov. "Multi-Dimensional Performance Optimization of Conducting Polymer-Based Supercapacitor Electrodes." *Sustainable Energy and Fuels*, 2017, 1: 1857-1874.
6. **K. D. Fong**,* T. Wang,* H.-K. Kim, R. V. Kumar, and S. K. Smoukov. "Semi-Interpenetrating Polymer Networks for Enhanced Supercapacitor Electrodes." *ACS Energy Letters*, 2017, 2: 2014-2020.
5. T. L. Sirich, **K. D. Fong**, B. Larive, G. J. Beck, G. M. Chertow, N. W. Levin, A. S. Kliger, N. S. Plummer, and 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.
4. 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, and Z. Bao. "High-performance Oxygen Reduction and Evolution Carbon Catalysis: From Mechanistic Studies to Device Integration." *Nano Research*, 2016, 10: 1163-1177.
3. F. J. O'Brien, **K. D. Fong**, T. L. Sirich, and T. W. Meyer. "More Dialysis Has Not Proven Much Better." *Seminars in Dialysis*, 2016, 29: 481-490.
2. 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, and 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.
1. J.D. Benck, S.C. Lee, **K. D. Fong**, J. Kibsgaard, R. Sinclair, and T.F. Jaramillo. "Designing Active and Stable Silicon Photocathodes for Solar Hydrogen Evolution Using Molybdenum Sulfide Nanomaterials." *Advanced Energy Materials*, 2014, 4: 1400739.

Presentations

34. "Ion correlations and transference numbers in polyelectrolyte solutions for Li-ion batteries." *American Physical Society*, Chicago, IL, March 2022. (Oral, [Padden Award Symposium](#))
33. "Bridging Length Scales in Electrolyte Transport Theory via the Onsager Framework." *University of Michigan Junior Faculty Candidate Seminar*, Ann Arbor, MI, March 2022. (Oral, [Invited](#))
32. "Bridging Length Scales in Electrolyte Transport Theory via the Onsager Framework." *California Institute of Technology Junior Faculty Candidate Seminar*, Pasadena, CA, February 2022. (Oral, [Invited](#))
31. "Bridging Length Scales in Electrolyte Transport Theory via the Onsager Framework." *Massachusetts Institute of Technology Junior Faculty Candidate Seminar*, Cambridge, MA, February 2022. (Oral, [Invited](#))
30. "Bridging Length Scales in Electrolyte Transport Theory via the Onsager Framework." *University of Colorado, Boulder Junior Faculty Candidate Seminar*, Boulder, CO, February 2022. (Oral, [Invited](#))
29. "Bridging Length Scales in Electrolyte Transport Theory via the Onsager Framework." *UC Santa Barbara Junior Faculty Candidate Seminar*, Santa Barbara, CA, January 2022. (Oral, [Invited](#))
28. "Bridging Length Scales in Electrolyte Transport Theory via the Onsager Framework." *Princeton University Junior Faculty Candidate Seminar* (virtual), January 2022. (Oral, [Invited](#))
27. "Bridging Length Scales in Electrolyte Transport Theory via the Onsager Framework." *Lennard-Jones Centre, University of Cambridge* (virtual), November 2021. (Oral, [Invited](#))
26. "The Onsager Framework for Transport Phenomena in Electrolyte Solutions." *Young Investigator Lecture Series, Electrochemical Society San Francisco Section* (virtual), November 2021. (Oral, [Invited](#))
25. "The Onsager Framework for Transport Phenomena in Electrolyte Solutions." *Pitzer Center for Theoretical Chemistry Seminar Series*, Berkeley, CA, November 2021. (Oral, [Invited](#))
24. "Bridging Length Scales in Electrolyte Transport Theory via the Onsager Framework." *American Institute of Chemical Engineers*, Boston, MA, November 2021. (Oral)
23. "Understanding Electrochemical Systems across Length and Time Scales." *American Institute of Chemical Engineers*, Boston, MA, November 2021. (Poster)
22. "The Onsager Framework for Transport Phenomena in Electrolyte Solutions." *Stanford University, hosted by Tom Markland* (virtual), August 2021. (Oral, [Invited](#))
21. "The Onsager Framework for Transport Phenomena in Electrolyte Solutions." *Drexel University, hosted by Maureen Tang* (virtual), July 2021. (Oral, [Invited](#))
20. "The Onsager Framework for Transport Phenomena in Electrolyte Solutions." *University of Cambridge, hosted by Clare Grey* (virtual), May 2021. (Oral, [Invited](#))
19. "Ion Correlations in Li-Ion Battery Electrolytes." *Women Excelling in Computational Molecular Engineering Seminar Series* (virtual), April 2021. (Oral, [Invited](#))
18. "Onsager Transport Coefficients: Theoretical Development and Application to Polyelectrolyte Solutions." *Lawrence Berkeley National Laboratory Electrochemistry Seminar* (virtual), March 2021. (Oral)
17. "Molecular Dynamics Characterization of Onsager Transport Coefficients and Transference Number in Polyelectrolyte Solutions." *American Institute of Chemical Engineers* (virtual), November 2020. (Oral)
16. "Theory of Irreversible Thermodynamics and Non-Equilibrium Statistical Mechanics for Transport Phenomena in Electrolyte Solutions." *American Institute of Chemical Engineers* (virtual), November 2020. (Oral)
15. "Transport Phenomena in Electrolyte Solutions: Non-Equilibrium Thermodynamics and Statistical Mechanics." *Battery Modeling Webinar Series* (virtual), October 2020. (Oral, [Invited](#))
14. "Modifications to a Graduate Pedagogy Course to Promote Active Learning and Inclusive Teaching." *American Society for Engineering Education* (virtual), June 2020. (Oral)
13. "Transport Phenomena in Electrolyte Solutions: Ion Correlation Analysis using Green-Kubo Relations." *Lawrence Berkeley National Laboratory, hosted by Gerd Ceder* (virtual), April 2020. (Oral, [Invited](#))
12. "Li-Ion Transference Numbers in Nonaqueous Polyelectrolyte Solutions." *Gordon Research Conference on Batteries*, Ventura, CA, February 2020. (Poster)
11. "Transport Phenomena in Electrolyte Solutions: Non-Equilibrium Thermodynamics and Statistical Mechanics." *Berkeley Statistical Mechanics Meeting*, Berkeley, CA, January 2020. (Oral)
10. "Charge Transport in Nonaqueous Polyelectrolyte Solutions for Li-Ion Batteries: Ion-Ion Correlations and the True Transference Number from Molecular Dynamics Simulations." *American Institute of Chemical Engineers*, Orlando, FL, November 2019. (Poster)

FIRST PLACE IN MATERIALS ENGINEERING AND SCIENCES DIVISION POSTER COMPETITION

9. "Improving a Graduate Pedagogy Course to Support Inclusive Teaching and Active Learning." *American Institute of Chemical Engineers*, Orlando, FL, November 2019. (Poster)

8. "Molecular Dynamics Simulations of Ion Transport in High Transference Number Polyelectrolytes for Li-Ion Batteries." *American Physical Society*, Boston, MA, March 2019. (Oral)
7. "Interpenetrated Electron/Ion Conducting Polymer Networks for Enhanced Supercapacitor Electrodes." *Annual International Scientific Symposium of the Department of Chemical and Pharmaceutical Engineering*, Sofia University, Malyovitsa, Bulgaria, March 2017. (Oral)
6. "Improving Measurements of Intrinsic Activity and Selectivity for Hydrogen Evolution Electrocatalysts." *David M. Mason Lecture Series Poster Session*, Stanford, CA, May 2016. (Poster)
5. "Improving Electrochemically Active Surface Area Measurements for Fundamental Understanding of Hydrogen Evolution Catalysts." *Vice Provost of Undergraduate Education (VPUE) Chemical Engineering Summer Research Poster Session*, Stanford, CA, September 2015. (Poster)
4. "Improving Electrochemically Active Surface Area Measurements for Fundamental Understanding of Hydrogen Evolution Catalysts." *Stanford SUNCAT Summer Institute*, Stanford, CA, August 2015. (Poster)
3. "Experimental Studies of Shutdown Procedures for Water-Gas Shift Catalysts in High Temperature Polymer Electrolyte Fuel Cell Systems." *American Chemical Society*, Denver, CO, March 2015. (Poster)
2. "Quantification of Hydrogen and Oxygen Production: Assessing Selectivity of Electrocatalysts for Solar Water Splitting." *American Institute of Chemical Engineers*, San Francisco, CA, November 2013. (Poster)
1. "Quantification of Hydrogen and Oxygen Production: Assessing Selectivity of Electrocatalysts for Solar Water Splitting." *Vice Provost of Undergraduate Education (VPUE) Chemical Engineering Summer Research Poster Session*, Stanford, CA, September 2013. (Poster)

Teaching Experience

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)

Stanford University

Stanford, CA

TEACHING ASSISTANT

Mar. 2015 - Jun. 2016

- Introduction to Chemical Engineering (ChemEng 20; Spring 2015, 2016)
- An Exploration of Art Materials: The Intersection of Art and Science (ChemEng 12SC, Stanford Sophomore College Program; Sept 2015)

UNDERGRADUATE TUTOR

Sept. 2014 - Jun. 2015

- Organic chemistry tutor, Center for Teaching and Learning

Service & Outreach

Reviewer for Journals

- *Chemistry of Materials*, *Energy & Environmental Materials*, *Journal of Materials Chemistry A*, *Macromolecules*, *Materials Advances*, *Wiley-VCH books*

Research Mentor | UC Berkeley

Berkeley, CA

- Alexandra Ringsby, Undergraduate in Chemical and Biomolecular Engineering
- Rachael Lee, Undergraduate in Materials Science and Engineering

Aug. 2019 - May 2021

May 2021 - Aug. 2021

Graduate Student Advisory Committee | UC Berkeley Dept. of Chemical Engineering

Berkeley, CA

- Led the creation of an Undergraduate Research Portal compiling available positions and resources for undergraduates interested in research

May 2020 - Present

Remote Teaching Committee | UC Berkeley Dept. of Chemical Engineering

Berkeley, CA

- Supported the transition to virtual education during COVID-19, including compiling and distributing best practices for remote teaching *Jun. 2020 - May 2021*

Community Education Partnerships

Virtual

VOLUNTEER TUTOR*Dec. 2020 - Dec. 2021*

- Provided weekly math tutoring to high school student experiencing housing insecurity