

# Kara D. Fong

✉ karafong@caltech.edu

## Professional Appointments

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### California Institute of Technology

(INCOMING) ASSISTANT PROFESSOR OF CHEMICAL ENGINEERING

Pasadena, CA

Starting Jun. 2025

### University of Cambridge

SCHMIDT SCIENCE FELLOW

JUNIOR RESEARCH FELLOW IN TRINITY COLLEGE

Advisors: Clare Grey, Angelos Michaelides

Cambridge, UK

2022 - 2024

2022 - 2025

## Education

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### 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

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### RESEARCH

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 (*declined*)

2022 Stanford Science Fellowship (*declined*)

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

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### Google Scholar

27. X.A. Advincula, **K.D. Fong**<sup>\*</sup>, A. Michaelides,<sup>\*</sup> C. Schran.<sup>\*</sup> "The graphene-water interface is acidic." *arXiv preprint*, 2024, arXiv:2408.04487.
26. N. O'Neill, B.X. Shi, **K.D. Fong**, A. Michaelides,<sup>\*</sup> C. Schran.<sup>\*</sup> "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.
25. **K.D. Fong**<sup>\*</sup>, B. Sumić, N. O'Neill, C. Schran, C.P. Grey,<sup>\*</sup> Angelos Michaelides.<sup>\*</sup> "The Interplay of Solvation and Polarization Effects on Ion Pairing in Nanoconfined Electrolytes." *Nano Letters*, 2024, 24, 16: 5024-5030.
24. O. A. Cohen, H. Macdermott-Opeskin, L. Lee, T. Hou, **K. D. Fong**, R. Kingsbury, J. Wang, K. A. Persson.<sup>\*</sup> "SolvationAnalysis: A Python Toolkit for Understanding Liquid Solvation Structure in Classical Molecular Dynamics Simulations." *The Journal of Open Source Software*, 2023, 8, 84: 5183.
23. H. K. Bergstrom, **K. D. Fong**, D. Halat, C. A. Karouta, H. C. Celik, J. A. Reimer, B. D. McCloskey.<sup>\*</sup> "Ion correlation and negative lithium transference in polyelectrolyte solutions." *Chemical Science*, 2023, 14, 24: 6546-6557.
22. P. K. Jones, **K. D. Fong**, K. A. Persson, A. A. Lee.<sup>\*</sup> "Inferring Global Dynamics from Local Structure in Liquid Electrolytes." *arXiv preprint*, 2022, arXiv:2208.03182.
21. J. Cheng, **K. D. Fong**, K. A. Persson.<sup>\*</sup> "Materials design principles of amorphous cathode coatings for lithium-ion battery applications." *Journal of Materials Chemistry A*, 2022, 10:22245-56.
20. J. Self, H. K. Bergstrom, **K. D. Fong**, B. D. McCloskey, K. A. Persson.<sup>\*</sup> "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.<sup>\*</sup> "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,<sup>\*</sup> K. A. Persson.<sup>\*</sup> "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.<sup>\*</sup> "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,<sup>\*</sup> K. A. Persson.<sup>\*</sup> "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,<sup>\*</sup> K. A. Persson.<sup>\*</sup> "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.<sup>\*</sup> "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.<sup>\*</sup> "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.<sup>\*</sup> "Transport in Superconcentrated LiPF<sub>6</sub> and LiBF<sub>4</sub>/Propylene Carbonate Electrolytes." *ACS Energy Letters*, 2019, 4: 2843-2849.
11. J. Self, **K. D. Fong**, E. R. Logan, and K. A. Persson.<sup>\*</sup> "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,<sup>\*</sup> and K. A. Persson.<sup>\*</sup> "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.<sup>\*</sup> "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.<sup>\*</sup> "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.<sup>\*</sup> "Multi-Dimensional Performance Optimization of Conducting Polymer-Based Supercapacitor Electrodes." *Sustainable Energy and Fuels*, 2017, 1: 1857-1874.

6. **K. D. Fong**,<sup>†</sup> T. Wang,<sup>†</sup> 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<sub>urea</sub> 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

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### Invited Presentations

2024 Nov	Department of Chemistry, 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

2024 Oct	American Institute of Chemical Engineers Annual Meeting, San Diego, CA (oral)
2023 Sept	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)
<b>FIRST PLACE IN MATERIALS ENGINEERING AND SCIENCES DIVISION POSTER COMPETITION</b>	
2019 Mar	American Physical Society March Meeting, Boston, MA (oral)

## Teaching Experience

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### 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)

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; Sept 2015)

UNDERGRADUATE TUTOR

Sept. 2014 - Jun. 2015

- Organic chemistry tutor, Center for Teaching and Learning

## Academic and Professional Service

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### Conference/Workshop Organization and Service

- Reviewer: Faraday Institution Conference, 2024
- Organizer and Instructor: Lennard-Jones Centre Summer School, University of Cambridge, 2024

### Journal Reviewer

- *ACS Energy Letters*, *Chemical Science*, *Chemistry of Materials*, *Energy & Environmental Materials*, *Journal of the American Chemical Society*, *Journal of The Electrochemical Society*, *Journal of Materials Chemistry A*, *Macromolecules*, *Materials Advances*, *Wiley-VCH books*

### Proposal Reviewer

- Department of Energy (BES Condensed Phase and Interfacial Molecular Science)

### 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
- Remote Teaching Committee

May 2020 - May 2022

Jun. 2020 - May 2021

## Research Mentoring

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### University of Cambridge

- Ioannis Karageorgiou, Undergraduate in Chemistry
- Barbara Sumić, Part III Student in Chemistry
- Dominic Thomas, Part III Student in Chemistry
- Xavier Rosas Advincula, PhD Student in Chemistry

Jun. 2024 - Aug. 2024

Oct. 2023 - May 2024

Jun. 2023 - May 2024

Nov. 2022 - Present

### University of California, Berkeley

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

May 2021 - Aug. 2021

Aug. 2019 - May 2021

## Outreach

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- **Organizer**, Lennard-Jones Centre Gender Equality Network, University of Cambridge
- **Volunteer math tutor**, Community Education Partnerships
- **Mentor**, Society of Hispanic Professional Engineers, Bay Area Chapter
- **Facilitator**, Society of Women Engineers SWE++ Tech Day, UC Berkeley
- **Volunteer judge**, GOLD Science Fair, UC Berkeley
- **Mentor**, Berkeley Energy & Resources Collaborative

Sept 2023 - Present

Dec 2020 - Dec 2021

Nov 2020 - May 2021

Nov 2020

Jan 2020, Jun 2021

Mar 2018 - Sept 2018