

ALEC S. HO

Berkeley, California
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EDUCATION

University of California at Berkeley, Berkeley, CA

PhD Candidate, Chemical and Biomolecular Engineering June 2023 (expected graduation)

California Institute of Technology, Pasadena, CA

BS, Chemical Engineering (Materials Track) with Minor in Computer Science June 2018

RESEARCH EXPERIENCE

Graduate Research

Department of Chemical and Biomolecular Engineering, UC Berkeley, Berkeley, CA 2018-present

Advisor: Professor Nitash P. Balsara

- Visualized lithiation and lithium plating within batteries during fast charging in 3D using synchrotron X-ray microtomography
- Processed datasets of graphite electrodes using ImageJ, Avizo, and MATLAB to quantify 3D lithiation and lithium plating current densities during rest
- Fabricated lithium metal symmetric cells with polymer electrolytes for polarization experiments to quantify lithium cell lifetime
- Visualized morphology of lithium dendrite growth through solid block copolymer electrolytes using X-ray microtomography
- Characterized ion transport in block copolymer electrolytes using electrochemical impedance spectroscopy, and galvanostatic and potentiostatic techniques
- Wrote successful proposals to use instruments at the Advanced Light Source

Undergraduate Research

2015-2018

Joint Center for Artificial Photosynthesis, Caltech, Pasadena, CA

Advisors: Professor Chengxiang Xiang, Professor Nathan S. Lewis

- Prototyped a hybrid bipolar vanadium redox cell for safe hydrogen-fuel production and storage, achieving >99.8% Faradaic efficiency and 87% efficient overall operation
- Designed a method for fabricating 10x solar concentrators with 3D-printing and chemical deposition, obtaining a 7x increase in solar flux
- Optimized double-layer TiO₂/SiO₂ thin-film patterned coatings, improving solar conversion efficiency loss by 50% (1% vs. 2% loss) for 100x longer run times in corrosive environments

Energy Systems Lab Intern

Summer 2017

Xerox PARC, Palo Alto, CA

- Prototyped a transparent, insulating polymer-aerogel for windowpane applications, increasing size by over 1000%, reducing cracking defects and achieving 25% higher porosity
- Led project to scale up and showcase metamaterial-enabled passive radiative cooling film, optimizing formulation and process to reach temperatures 5°C cooler than industry standard

PUBLICATIONS

9. Hoffman, Z., **Ho, A. S.**, Chakraborty, S., & Balsara, N. P. (2022). Limiting Current Density in Single-Ion-Conducting and Conventional Block Copolymer Electrolytes. *Journal of The Electrochemical Society*, 169(4). <https://doi.org/10.1149/1945-7111/ac613b>
8. **Ho, A. S.***, Westover, A. S.*, Browning, K., Maslyn, J. A., Parkinson, D. Y., Sahore, R., Dudney, N., & Balsara, N. P. (2022). Comparing the Purity of Rolled versus Evaporated Lithium Metal Films

- Using X-ray Microtomography. *ACS Energy Letters*, 7(3), 1120–1124.
<https://doi.org/10.1021/acseenergylett.2c00255>
7. Meckler, S. M., Iftime, G., Nallapaneni, A., Van Overmeere, Q., Keoshkerian, B., Bulger, E., **Ho, A. S.**, Zhu, C., Rivest, J. B., & Chintapalli, M. (2022). Optically Transparent Polymer Aerogels Via Controlled Radical Polymerization. *ACS Applied Polymer Materials*, 4(3), 1565–1569.
<https://doi.org/10.1021/acsapm.1c01854>
 6. Chakraborty, S., Sethi, G. K., Frenck, L., **Ho, A. S.**, Villaluenga, I., Wantanabe, H., & Balsara, N. P. (2021). Effect of Yield Stress on Stability of Block Copolymer Electrolytes against Lithium Metal Electrodes. *ACS Applied Energy Materials*, 5(1), 852–861. <https://doi.org/10.1021/acsaem.1c03288>
 5. **Ho, A. S.**, Parkinson, D. Y., Finegan, D. P., Trask, S. E., Jansen, A. N., Tong, W., & Balsara, N. P. (2021). 3D Detection of Lithiation and Lithium Plating in Graphite Anodes during Fast Charging. *ACS Nano*, 15(6), 10480–10487. <https://doi.org/10.1021/acsnano.1c02942>
 4. Maslyn, J. A., Frenck, L., Veeraraghavan, V. D., Müller, A., **Ho, A. S.**, Marwaha, N., Loo, W. S., Parkinson, D. Y., Minor, A. M., & Balsara, N. P. (2021). Limiting Current in Nanostructured Block Copolymer Electrolytes. *Macromolecules*, 54(9), 4010–4022.
<https://doi.org/10.1021/acs.macromol.1c00425>
 3. Frenck, L., Veeraraghavan, V. D., Maslyn, J. A., Müller, A., **Ho, A. S.**, Loo, W. S., Minor, A. M., & Balsara, N. P. (2020). Effect of salt concentration profiles on protrusion growth in lithium-polymer-lithium cells. *Solid State Ionics*, 358, 115517. <https://doi.org/10.1016/J.SSI.2020.115517>
 2. **Ho, A. S.**, Barai, P., Maslyn, J. A., Frenck, L., Loo, W. S., Parkinson, D. Y., Srinivasan, V., & Balsara, N. P. (2020). Uncovering the Relationship between Diameter and Height of Electrodeposited Lithium Protrusions in a Rigid Electrolyte. *ACS Applied Energy Materials*, 3, 9645–9655.
<https://doi.org/10.1021/acsaem.0c01175>
 1. **Ho, A. S.**, Zhou, X., Han, L., Sullivan, I., Karp, C., Lewis, N. S., & Xiang, C. (2019). Decoupling H₂(g) and O₂(g) Production in Water Splitting by a Solar-Driven V^{3+/2+}(aq, H₂SO₄) | KOH(aq) Cell. *ACS Energy Letters*, 4(4), 968–976. <https://doi.org/10.1021/acseenergylett.9b00278>

(* indicates equal contributions)

PATENTS

2. M. Chintapalli, B. Keoshkerian, **A.S. Ho**, G. Iftime, Q.V. Overmeere, E. Bulger, “Method to Produce Colorless, High Porosity, Transparent Polymer Aerogels,” filed by Palo Alto Research Center Incorporated, July 26, 2018. Patent Number 10836855. Published on November 17, 2020.
1. C.D. Karp; **A.S. Ho**, X. Zhou, C. Xiang, N.S. Lewis, “Use of Intermediates in Solar Fuels Generation,” filed by the California Institute of Technology, February 26, 2019. Publication Number 20190264338. Published on August 29, 2019.

PRESENTATIONS

4. Materials Research Society Fall Meeting, Digital Meeting (November 2020). *Factors Influencing Lithium Protrusion Nucleation and Cycle Life in Solid Polymer Electrolytes for Battery Applications*. **Ho, A. S.**; Maslyn, J. A.; Balsara, N. P. (Oral)
3. 238th Electrochemical Society Meeting, Digital Meeting (October 2020). *Uncovering the Relationship between Diameter and Height of Electrodeposited Lithium Protrusions in a Rigid Electrolyte*. **Ho, A. S.**; Balsara, N. P. (Oral)
2. Gordon Research Conference: Batteries, Ventura, CA (February 2020). *Growth of Lithium Globules through a Rigid Block Copolymer Electrolyte as a Function of Electrolyte Thickness*. **Ho, A. S.**; Balsara, N. P. (Poster)

1. Materials Research Society March Meeting, Phoenix, AZ (March 2018). *Decoupling Hydrogen Evolution Reaction and Oxygen Evolution Reaction in a Solar-Driven Vanadium Redox Cell Supported by a Bipolar Membrane with Earth-Abundant Catalysts*. **Ho, A. S.**; Xiang, C. (Oral)

TEACHING EXPERIENCE

Department of Chemical and Biomolecular Engineering, UC Berkeley, Berkeley, CA

Research Mentor for (3) Graduate students, UC Berkeley

Graduate Student Instructor

- ChE 178: Polymer Science and Technology Fall 2021
- ChE 90: Science and Engineering of Sustainable Energy Spring 2020
- ChE 40: Introduction to Chemical Engineering Design Fall 2018

HONORS & AWARDS

- National Science Foundation Graduate Research Fellowship 2020-present
- Best Presentation Award, Materials Research Society Fall Meeting 2020
- Caltech Edinburgh Scholar – Study Abroad Program 2017
- Named Summer Undergraduate Research Fellowship by SURF Board, Caltech 2016
- Summer Undergraduate Research Fellowship, Caltech 2016

OUTREACH, SERVICE, AND ACTIVITIES

- Volunteer, BASIS (Bay Area Scientists in Schools) 2018-2022
- Volunteer, Advanced Light Source Outreach Events 2019
- Lab safety coordinator, Lawrence Berkeley National Laboratory 2020-present
- Webmaster, Graduate Student Advisory Committee, CBE, UC Berkeley 2019-2021
- Tau Beta Pi Engineering Honor Society 2018

TECHNICAL SKILLS

Characterization: Synchrotron X-ray tomography, AC Impedance Spectroscopy, Voltammetry, Cell polarization and cycling, SEM, BET, Ellipsometry

Other Lab: Glovebox lithium cell fabrication, Prototyping, Photolithography, RF-Sputtering, Spin-Coating, Stable free radical polymerization

Programming Languages: Proficient with Python, Familiar with C, Javascript, Assembly

Software: Proficient in MATLAB, Mathematica, EC-Lab, Familiar with SolidWorks