Kevin W. Gao

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Education

University of California, Berkeley 2017 – present
Ph.D. Candidate in Chemical Engineering – 4.0/4.0 GPA

California Institute of Technology 2013 – 2017
B.S. Chemical Engineering – 3.9/4.0 GPA

Experience

Graduate Student, University of California, Berkeley 2017 – present
Advisor: Professor Nitash P. Balsara

- Lab safety coordinator and affiliate at Lawrence Berkeley National Lab
- Studying thermodynamics and ion transport of polymer blends for lithium battery applications via neutron scattering experiments and electrochemical techniques
- First demonstration of a miscible polymer electrolyte blend made up of poly(ethylene oxide), poly(1,3,6-trioxocane), and a lithium salt
- Synthesized hybrid organic-inorganic block copolymer electrolytes, characterized their ion transport properties, and determined their structure via x-ray scattering experiments
- Developed a new thermodynamic model for the swelling of charged polymeric gels in ionic solutions, adding enthalpic and elastic contributions to the classic expression for Donnan equilibrium

Summer Undergraduate Research Fellow, Massachusetts Institute of Technology 2016
Advisor: Professor Klavs F. Jensen

- Developed a reaction optimization strategy via on-demand synthesis in microliter droplets
- Implemented a MINLP algorithm that reduced experiments needed for optimization by 57%

Undergraduate Research Fellow, California Institute of Technology 2014 – 2015
Advisor: Professor Brian M. Stoltz

- Synthesized and characterized intermediates for the total synthesis of jorumycin

Intern, Los Alamos National Laboratory: P-24 Plasma Physics 2012 – 2013
Advisor: Dr. Thomas P. Intrator

- Adapted design and constructed a fiber optic-positioning trigger to detect flux rope light emission

Graduate Student Instructor, University of California, Berkeley
CBE154 – Chemical Engineering Laboratory (Spring Semester 2019-20)
CBE162 – Process Dynamics and Controls (Fall Semester 2018-19)

Teaching Assistant, California Institute of Technology
ChE101 – Chemical Reaction Engineering (Winter Term 2016-17)
ChE9 – Chemical Synthesis and Characterization Engineering Lab (Spring Term 2015-2016)
Ch3a – Introduction to Chemistry Lab (Fall Term 2015-2016, Winter Term 2015-16)

Skills

Programming: MATLAB, Python, C, HTML, CSS
Software: Microsoft Office, EC-Lab, Igor, ChemDraw, MestReNova
Laboratory: DSC, EIS, GPC, NMR, SANS, SAXS, TGA, rheology, glovebox, cell assembly, schlenk line
Languages: English, Mandarin Chinese

Publications

1. **K.W. Gao**, X. Yu, R. Darling, J. Newman, N. Balsara. "Swelling of charged gels in ionic solutions and elastic contributions to the Donnan potential," *Macromolecules.* 2021. Submitted.
2. D. Halat, R. Snyder, S. Sundararaman, Y. Choo, **K.W. Gao**, Z. Hoffman, B. Abel, L. Grundy, M. Galluzzo, M. Gordon, H. Celik, J. Urban, D. Prendergast, G. Coates, N. Balsara, J. Reimer. "Modifying Li^+ and anion diffusivity in polyacetal electrolytes: a PFG-NMR study of ion self-diffusion," *Chem. Mater.* 2021. Under review.
3. R. Snyder, Y. Choo, **K.W. Gao**, D. Halat, S. Sundararaman, B. Abel, L. Grundy, D. Prendergast, J. Reimer, G. Coates, N. Balsara. "Improved Li^+ transport in polyacetal electrolytes: conductivity and current ratio in a series of polyacetals," *ACS Energy Lett.* 2021. 6, 1886-1891. DOI: 10.1021/acsenergylett.1c00594
4. **K.W. Gao** and N. Balsara. "Electrochemical properties of poly(ethylene oxide) electrolytes above the entanglement threshold," *Solid State Ionics*. 2021. 364. DOI: 10.1016/j.ssi.2021.115609
5. **K.W. Gao**, W. Loo, R. Snyder, B. Abel, Y. Choo, S. Teixeira, A. Lee, B. Garetz, G. Coates, N. Balsara. "Miscible polyether/poly(ether-acetal) electrolyte blends," *Macromolecules.* 2020. 53, 14, 5728-5739. DOI: 10.1021/acs.macromol.0c00747
6. W. Loo, A. Faraone, L. Grundy, **K.W. Gao,** N. Balsara. "Polymer dynamics in block copolymer electrolytes detected by neutron spin echo," *ACS Macro Lett.* 2020. 9, 5, 639-645. DOI: 10.1021/acsmacrolett.0c00236
7. **K.W. Gao**, X. Jiang, Z. Hoffman, G. Sethi, S. Chakraborty, N. Balsara. "Optimizing the monomer structure of polyhedral oligomeric silsesquioxane for ion transport in hybrid organic-inorganic block copolymers," *J. Polym. Sci.* 2020. 58, 363-371. DOI: 10.1002/pol.20190073
8. L. Baumgartner, C. Coley, B. Reizman, **K.W. Gao**, K. Jensen. "Optimum catalyst selection over continuous and discrete process variables with a single droplet microfluidic reaction platform," *React. Chem. Eng.* 2018. 3, 301-311. DOI: 10.1039/C8RE00032H
9. J. Sears, T. Intrator, Y. Feng, H. Swan, J. Klarenbeek, **K.W. Gao**. "Investigating the momentum balance of a plasma pinch: An air-side stereoscopic imaging system for locating probes," *Rev. Sci. Instrum.* 2014. 85, 103509. DOI: 10.1063/1.4898176

Activities

- Co-founder of Ultra Seltzer of America | ultraseltzer.org
- Chemical engineering liaison for Berkeley Energy & Resources Collaborative (BERC)
- Member of Tau Beta Pi, AIChE, APS
- Four-year starter for Caltech's Men's Soccer Team

Awards and Honors

2017 National Defense Science & Engineering Graduate Fellowship
2014 Samuel and Berta Spalter Summer Undergraduate Research Fellowship
2013 US National Chemistry Olympiad Top 20 Study Camp Finalist
LANL Foundation $20,000 Gold Scholarship
J. Robert Oppenheimer Scholarship in Memory of Nicholas C. Metropolis
National Merit Scholarship