

Exponent®
Engineering & Scientific Consulting

Kyle Kersey, Ph.D., P.E.

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Professional Profile

Kyle Kersey is an Associate in the Thermal Sciences Practice at Exponent specializing in fires and thermal runaway events in electrochemical devices. Dr. Kersey has significant experience with carbon dioxide capture, mass transfer, polymer processing (electrospinning), small molecule and polymer organic synthesis, and inorganic chemistry including organometallic actinide (U and Th) complexes and Metal-Organic Frameworks.

During his Ph.D. studies in the R. F. Smith School of Chemical and Biomolecular Engineering at Cornell University, Dr. Kersey worked at the interface of chemistry and chemical engineering to develop and characterize new materials for carbon dioxide capture, specifically aimed at Direct Air Capture applications. Dr. Kersey developed several generations of robust and scalable hydrophobic electrospun composite fibers to remediate the CO2 selectivity and water-stability challenges of existing materials. He first explored the performance of liquid-like amine-grafted silica nanoparticles encapsulated within co-continuous polymer/ceramic fiber matrices to enhance the CO2 storage capacity of the nanoparticles and facilitate mass transport of air through the non-woven fiber mat for increased energy efficiency. In subsequent projects, he optimized the fibers' CO2 adsorption and kinetic performance through use of intrinsically microporous polymers and task-specific metal-organic frameworks to enhance internal mass transport, thermal stability, and cycle performance. Dr. Kersey has experience performing scanning electron microscopy (SEM), transmission electron microscopy (TEM), atomic force microscopy (AFM), X-ray diffraction (XRD), nuclear magnetic resonance (NMR), Fourier-transform infrared spectroscopy (FTIR), thermogravimetric analysis (TGA), and BET physisorption analysis to aid in characterization of these materials. Dr. Kersey also contributed to technoeconomic and life-cycle analyses of these composite fibers to better understand their potential in existing industrial scenarios.

Academic Credentials & Professional Honors

Ph.D., Chemical Engineering, Cornell University, 2023

M.S., Chemical Engineering, Cornell University, 2022

B.S.E., Chemical & Biomolecular Engineering, University of Pennsylvania, 2019

Austin Hooey Graduate Research Excellence Award (2023)

Phi Beta Kappa Honor Society (2019)

American Chemical Society Award (2019)

ACS Division of Inorganic Chemistry Undergraduate Award (2019)

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Licenses and Certifications

40-Hour Hazardous Waste Operation and Emergency Response Certification (HAZWOPER)

Certified Forklift Operator for Sit-Down Counterbalanced Forklifts

Certified Fire and Explosion Investigator (CFEI)

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Certified Vehicle Fire Investigator (CVFI)

Prior Experience

Graduate Researcher, Cornell University R. F. Smith School of Chemical and Biomolecular Engineering, 2019-2023

Graduate Teaching Assistant, Cornell University R. F. Smith School of Chemical and Biomolecular Engineering, 2020-2023

Undergraduate Researcher, University of Pennsylvania Department of Chemistry, 2016-2018

Professional Affiliations

American Institute of Chemical Engineers (AIChE) – Member

American Chemical Society (ACS) – Member

Publications

Kersey, KD; Lee GH, Xu JH; Kidder MK; Park AHA.; Joo YL. Encapsulation of Nanoscale Hybrid Materials within Electrospun Polymer/Ceramic Fibers for CO2 Capture. Advanced Functional Materials 2023; 2301649. https://doi.org/10.1002/adfm.202301649.

Salim MG, Vasudevan V, Schulman N, Zamani S, Kersey KD, Joshi Y, AlAmer M, Choi JI, Jang SS, Joo YL. Thermoresponsive Conductivity of Graphene-Based Fibers. Small 2023; 2204981. https://doi.org/10.1002/smll.202204981.

Cheisson T, Kersey KD, Mahieu N, McSkimming A, Gau MR, Carroll PJ, Schelter EJ. Multiple Bonding in Lanthanides and Actinides: Direct Comparison of Covalency in Thorium(IV)- and Cerium(IV)-Imido Complexes. Journal of the American Chemical Society 2019; 141:9185-9190. https://doi.org/10.1021/jacs.9b04061.

Durkin T, Kersey KD, Paolini J. Synthesis of Green Hydrocarbons using the AIR TO FUELS™ Technology; 2019. https://repository.upenn.edu/cbe_sdr/114/.

Presentations

Kersey KD, Lee GA, Xu J, Ochonma PI, Asgar H, Kidder MK, Gadikota G, Park AHA, Joo YL. Synergy: Tailoring Complementary Materials for Effective CO2 Capture and Connecting Research with Mentorship in Engineering. Austin Hooey Graduate Research Excellence Award Seminar, Ithaca, NY, 2023.

Kersey KD, Lee GA, Xu J, Ochonma PI, Asgar H, Kidder MK, Gadikota G, Park AHA, Joo YL.

Encapsulation of Nanoscale Adsorbents into Electrospun Polymer of Intrinsic Microporosity Fibers (PIMs) for Direct Air Capture of CO2. Ph.D. Thesis Defense, Ithaca, NY, 2023.

Kersey KD, Ochonma PI, Asgar H, Gadikota G, Joo YL. Enhanced Direct Air Capture of CO2 through Encapsulation of Metal-Organic Frameworks in Electrospun Polymers Fibers. Poster presentation, ACS Fall Meeting, San Francisco, CA, 2023.

Kersey KD, Lee GH, Xu JH, Kidder MK, Joo YL, Park AHA. Encapsulation of Nanoscale Organic Hybrid Materials in Electrospun Hydrophobic Polymer Fibers for Direct Air Capture. ACS Fall Meeting Energy & Fuels Division Mid-Career Award in Honor of Michelle K. Kidder, San Francisco, CA, 2023.

Kersey KD, Lee GH, Xu JH, Kidder MK, Joo YL, Park AHA. Encapsulation of Nanoscale Organic Hybrid Materials in Electrospun Polymer Fibers for Direct Air CO2 Capture. 12th Annual Chemical Engineering Graduate Research Symposium, Ithaca, NY, 2023.

Kersey KD, Lee GH, Xu JH, Kidder MK, Joo YL, Park AHA. Encapsulation of Nanoscale Organic Hybrid Materials in Electrospun Polymer/Ceramic Fibers for Direct Air Capture of CO2. AIChE Annual Meeting, Phoenix, AZ, 2022.

Kersey KD, Lee GH, Xu JH, Kidder MK, Joo YL, Park AHA. Encapsulation of Nanoscale Adsorbents into Electrospun Polymer/Ceramic Fibers for Direct Air Capture of CO2. Invited Lecture, Iceland School of Energy, Reykjavik, Iceland, 2022.

Kersey KD. Water Thermal Storage at Cornell University (Now… And in the Future), CHEME 6679: Energy Storage, Iceland School of Energy. Invited lecture, Iceland School of Energy, Reykjavik, Iceland, 2022.

Kersey KD, Lee GH, Xu JH, Kidder MK, Joo YL, Park AHA. Encapsulation of Nanoscale Organic Hybrid Materials in Polymer/Ceramic Fibers for Direct Air Capture of Carbon Dioxide. Poster presentation, 19th Annual International Conference on Carbon Dioxide Utilization, Princeton, NJ, 2022.

Kersey KD, Lee GH, Xu JH, Kidder MK, Joo YL, Park AHA. Encapsulation of Nanoscale Organic Hybrid Materials in Polymer/Ceramic Fibers for Direct Air Capture of Carbon Dioxide. Poster presentation, Carbon Capture, Utilization and Storage Gordon Research Conference/Seminar, Ventura, CA, 2022.