

# ANTHONY P. STRAUB

Assistant Professor

Department of Civil, Environmental and Architectural Engineering, University of Colorado Boulder  
Environmental Engineering Program | Materials Science and Engineering Program  
anthony.straub@colorado.edu

## Education

<b>Postdoc</b>	<b>Massachusetts Institute of Technology</b> , Cambridge, MA Department of Materials Science and Engineering	2019
<b>Ph.D.</b>	<b>Yale University</b> , New Haven, CT Department of Chemical & Environmental Engineering	2017
<b>M.Phil.</b>	<b>Yale University</b> , New Haven, CT Department of Chemical & Environmental Engineering	2015
<b>M.Sc.</b>	<b>Yale University</b> , New Haven, CT Department of Chemical & Environmental Engineering	2014
<b>B.S.</b>	<b>University of Illinois</b> , Urbana-Champaign, IL Department of Civil & Environmental Engineering	2012

## Academic Appointments and Professional Experience

<b>Assistant Professor</b> Department of Civil, Environmental, & Architectural Engineering University of Colorado Boulder	Aug. 2019 – Present
<b>Postdoctoral Research Fellow</b> Department of Materials Science & Engineering Massachusetts Institute of Technology, Advisor: Prof. Jeffrey Grossman	Nov. 2017 – July 2019
<b>National Science Foundation (NSF) Graduate Research Fellow</b> Department of Chemical & Environmental Engineering Yale University, Advisor: Prof. Menachem Elimelech	Aug. 2012 – Oct. 2017
<b>Research Intern</b> Department of Desalination & Water Treatment Ben-Gurion University of the Negev in Israel, Advisor: Prof. Moshe Herzberg	May – Aug. 2011, May – Aug. 2012
<b>Research Assistant</b> Department of Civil & Environmental Engineering University of Illinois at Urbana-Champaign, Advisor: Prof. Thanh (Helen) Nguyen	Jan. 2010 – May 2012

## Publications

***H-index: 20, Total citations: 3769***

### Peer-Reviewed Journal Articles (underline indicates student in Straub group)

1. Nguyen, D.T.; Lopez, K.P.; Lee, S.; Lee, J.; Hernandez, M.; **Straub, A.P.\*** “Water Desalination via Pressure-Driven Distillation with Chlorine-Resistant and Large-Area Polymeric Membranes.” *Environmental Science & Technology Letters* 10, 8, 711-717 (2023).
2. Nguyen, D.T.; Lee, S.; Lopez, K.P.; Lee, J.; **Straub, A.P.\*** “Pressure-driven distillation using air-trapping membranes for fast and selective water purification.” *Science Advances*, 9, 28, eadg6638 (2023).
3. Liu, W.; Wang, R.; **Straub, A.P.**; Lin, S.\* “Membrane Design Criteria and Practical Viability of Pressure-driven Distillation.” *Environmental Science & Technology*, 57, 5, 2129-2137 (2023).

4. Lopez, K.P.; Wang, R.; Hjelvik, E.H.; Lin, S.; **Straub, A.P.\*** “Toward a universal framework for evaluating transport resistances and driving forces in membrane-based desalination processes.” *Science Advances*, 9, 1, eade0413 (2023).
5. Nickerson, T.; McNally, D.; Antonio, E.; Toney, M.F.\*; Ban, C.\*; **Straub, A.P.\*** “Unlocking the potential of polymeric desalination membranes by understanding molecular-level interactions” *Chemical Science*, 14, 4, 751-770 (2023).
6. Shefer, I.<sup>1</sup>; Lopez, K.<sup>1</sup>; **Straub, A.P.\***; Epsztein, R.\* “Applying transition-state theory to explore transport and selectivity in salt-rejecting membranes: A critical review.” *Environmental Science & Technology* 56, 12, 7467–7483 (2022).
7. Lee, S.; **Straub, A.P.\*** “Analysis of Volatile and Semivolatile Organic Compound Transport in Membrane Distillation Modules.” *ACS ES&T Engineering* <https://doi.org/10.1021/acsestengg.1c00432> (2022).  
*Winner of 2022 ACS ES&T Engineering Best Paper Award.*
8. Jiang, H.; **Straub, A.P.**; Karanikola, V.\* “Ammonia Recovery with Sweeping Gas Membrane Distillation: Energy and Removal Efficiency Analysis.” *ACS ES&T Engineering* <https://doi.org/10.1021/acsestengg.1c00294> (2022)
9. **Straub, A.P.\***; Bergman, D.S.; Getachew, B.A.; Leahy, L.; Patel, J.J.; Ferralis, N.; Grossman, J.C.\* “Highly Conductive and Permeable Nanocomposite Ultrafiltration Membranes Using Laser-Reduced Graphene Oxide.” *Nano Letters* 21, 6, 2429–2435 (2021)
10. Lee, S.; **Straub, A.P.\*** “Opportunities for high productivity and selectivity desalination via osmotic distillation with improved membrane design.” *Journal of Membrane Science* 611, 118309 (2020)
11. **Straub, A.P.\***; Asa, E.; Zhang, W.; Nguyen, T.H.; Herzberg, M.\* “In-Situ Graft-Polymerization Modification of Commercial Ultrafiltration Membranes for Long-Term Fouling Resistance in a Pilot-Scale Membrane Bioreactor.” *Chemical Engineering Journal*, 382, 122865 (2020).
12. Wang, Z.; Horseman, T.; **Straub, A.P.**; Yip, N.Y.; Li, D.; Elimelech, M.\*; Lin, S.\* “Pathways and Challenges for Efficient Solar-Thermal Desalination.” *Science Advances*, 5, eaax0763 (2019).
13. Shaulsky, E.; Karanikola, V.; **Straub, A.P.**; Deshmukh, A.; Zucker, I.; Elimelech, M.\* “Asymmetric Membranes for Membrane Distillation and Thermo-Osmotic Energy Conversion.” *Desalination*, 452, 141-148 (2019).
14. Lee, J.\*; **Straub, A.P.**, Elimelech, M. “Vapor-gap membranes for highly selective osmotically driven desalination.” *Journal of Membrane Science* 555, 407-417 (2018).
15. Deshmukh, A.; Boo, C.; Karanikola, V.; Lin, S.; **Straub, A.P.**; Tong, T.; Warsinger, D.M.; Elimelech, M.\* “Membrane Distillation at the Water-Energy Nexus: Limits, Opportunities, and Challenges.” *Energy & Environmental Science* 11, 1177-1196 (2018).
16. Rahimi, M.; **Straub, A.P.**; Zhang, F.; Zhu, X.; Elimelech, M.; Gorski, C. A.; Logan, B.E.\* “Emerging Electrochemical and Membrane-Based Systems to Convert Low-Grade Heat to Electricity.” *Energy & Environmental Science* 11, 276-285 (2017).
17. **Straub, A.P.**; Elimelech, M.\* “Energy Efficiency and Performance Limiting Effects in Thermo-Osmotic Energy Conversion from Low-Grade Heat.” *Environmental Science & Technology* 51, 12925-12931 (2017).
18. **Straub, A.P.**; Yip, N.Y.; Lin, S.; Lee, J.; Elimelech, M.\* “Harvesting Low-Grade Heat Energy Using Thermo-Osmotic Vapour Transport Through Nanoporous Membranes.” *Nature Energy* 1, Article Number: 16090 (2016).

19. Matthew, L.E.\*; Piedra, L.M.; Wu, C.F; Kramer-Díaz, A.; Wang, H.; **Straub, A.P.**; Nguyen, T.H. “Social Work and Engineering: Lessons from a Water Filtration Project in Guatemala” *International Social Work* 4, Article Number: 655869 (2016).
20. **Straub, A. P.**; Deshmukh, A.; Elimelech, M.\* “Pressure-Retarded Osmosis for Power Generation from Salinity Gradients: Is It Viable?” *Energy & Environmental Science* 9, 31-48 (2016).
21. Bar-Zeev, E.; Perreault, F.; **Straub, A. P.**; Elimelech, M.\* “Impaired Performance of Pressure-Retarded Osmosis Due to Irreversible Biofouling.” *Environmental Science & Technology* 49, 13050-13058 (2015).
22. **Straub, A. P.**; Osuji, C.O.; Cath, T.Y.; Elimelech, M.\* “Selectivity and Mass Transfer Limitations in Pressure-Retarded Osmosis at High Concentrations and Increased Operating Pressures.” *Environmental Science & Technology* 49, 12551-12559 (2015).
23. **Straub, A. P.**; Lin, S.; Elimelech, M.\* “Module-Scale Analysis of Pressure-Retarded Osmosis: Performance Limitations and Implications for Full-Scale Operation.” *Environmental Science & Technology* 48, 12435-12444 (2014).
24. Lin, S.; **Straub, A. P.**; Elimelech, M.\* “Thermodynamic Limits of Extractable Energy by Pressure-Retarded Osmosis.” *Energy & Environmental Science* 7, 2706-2714 (2014).
25. Wang, H.; Narihiro, T.; **Straub, A. P.**; Pugh, C. R.; Tamaki, H.; Moor, J. F.; Bradley, I. M.; Kamagata, Y.; Liu, W.T.; Nguyen, T. H.\* “MS2 Bacteriophage Reduction and Microbial Communities in Biosand Filters.” *Environmental Science & Technology* 48, 6702–6709 (2014).
26. **Straub, A.P.**; Yip, N.Y.; Elimelech, M.\* “Raising the Bar: Increased Hydraulic Pressure Allows Unprecedented High Power Densities in Pressure-Retarded Osmosis.” *Environmental Science & Technology Letters* 1, 55–59 (2014).
27. Tirafferi, A.; Yip, N.Y.; **Straub, A.P.**; Romero-Vargas Castrillon, S.; Elimelech, M.\* “A Method for Simultaneous Determination of Transport and Structural Parameters of Forward Osmosis Membranes.” *Journal of Membrane Science* 444, 523–538 (2013).
28. Bradley, I.; **Straub, A.P.**; Maraccini, P.; Markazi, S.; Nguyen, T. H.\* “Iron Oxide Amended Biosand Filters for Virus Removal.” *Water Research* 45, 4501-4510. (2011).
29. Romero, O.C.; **Straub, A.P.**; Kohn, T.; Nguyen, T.H.\* “Role of Temperature and Suwannee River Natural Organic Matter on Inactivation Kinetics of Rotavirus and Bacteriophage MS2 by Solar Irradiation.” *Environmental Science & Technology* 45, 10385-10393 (2011).

#### Submitted or Under Review Journal Articles

1. Lee, S.; Shirts, M.R.; **Straub, A.P.**\* “Predicting organic solute rejection in reverse osmosis and nanofiltration with machine learning and molecular fingerprints.” Under revision.
2. Kalam, S.; Dutta, A.; Li, X.; Nguyen, D.T.; Lee, S.; **Straub, A.P.**\* “Vapor-Gap Membranes for Energy and Resource Recovery: Fundamental and Applications.” Submitted.
3. Wang, R.; Liu, W.; Lee, J.; Lopez, K.P.; Laris, O.; **Straub, A.P.**; Lin, S.\* “Flux Limit in Membrane Distillation and Anomalies with Nanopore Evaporation.” Under review in *Nature Water*.
4. Roth, R.S.; Birnhack, L.; Avidar, M.; Hjelvik, E.A.; **Straub, A.P.**; Epsztein, R.\* “Effect of solution ions on the charge and performance of nanofiltration membranes.” Under revision.

#### Manuscripts to be submitted in the next six months

1. Lopez, K.; Nguyen, M.; Ban, C.; **Straub, A.P.**\* “Real-time monitoring of pore wetting in pressure-driven distillation using impedance spectroscopy.” In preparation for submission February 2024.

2. Schwindt, N.S.; Avidar, M.; Epsztein, R.; **Straub, A.P.**, Shirts, M.R.\* “Membrane heterogeneity alters our interpretation of effective energy barriers to transport.” In preparation for submission February 2024.
3. Cairney, H.; Hjelvik, E.; **Straub, A.P.**\* “Impact of oxidative chemicals on hydrophobic porous membranes used in membrane distillation.” In preparation for submission February 2024.
4. Lee, S.; Nguyen, D.T.; Hjelvik, E.A.; **Straub, A.P.**\* “Omniphobic membranes with re-entrant structures for separating low surface tension liquids in pressure-driven distillation.” In preparation for submission March 2024.
5. Nguyen, D.T.; Lopez, K.P.; Fan, S.; Ding, Y.; **Straub, A.P.**\* “High-performance polymeric membranes for pressure-driven distillation.” In preparation for submission March 2024.
6. Lopez, K.P.; Fan, S.; Ding, Y.; **Straub, A.P.**\* “Organic fouling behavior in pressure-driven distillation.” In preparation for March 2024.
7. Lopez, K.P.; Nguyen, D.T.; **Straub, A.P.**\* “Evaporation coefficient of water measured in nanoscale pores.” In preparation for submission April 2024.

## Awards and Honors

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<b>Dean’s Performance Award for Junior Faculty – University of Colorado Boulder</b>	2023
One annual award in the College of Engineering with \$5,000 fund.	
<b>Early Career Researcher Award - University of Colorado Boulder</b>	2023
<b>Department of Civil, Environmental, and Architectural Engineering</b>	
One annual award for excellence in research for pre-tenure faculty	
<b>North American Membrane Society: Young Membrane Scientist Award</b>	2022
One of three annual awards to researchers in membrane science.	
<b>Swiss National Science Foundation Postdoc Mobility Fellowship</b>	2018
\$76,000 fellowship to support two years of postdoctoral research.	
<b>Marie Skłodowska-Curie Individual Fellowship (Declined)</b>	2017
\$190,000 fellowship to support two years of postdoctoral research.	
<b>National Science Foundation (NSF) Graduate Research Fellowship</b>	2012
\$126,000 fellowship to support three years of graduate studies.	
<b>ACS Graduate Student Award in Environmental Chemistry</b>	2016
Awarded by the American Chemical Society for record of research productivity.	
<b>Huddleston and Blum Graduate Fellowship</b>	2015
Granted a year of funding for one engineering graduate student at Yale.	
<b>Central States Water &amp; Environment Association (CSWEA) Award</b>	2012
Awarded to one student per year for academic excellence.	
<b>Wilfred F. and Ruth Davison Langelier Scholarship</b>	2011
\$4,000 scholarship based on academic performance and extracurricular activities.	
<b>Morrill Engineering Program Award</b>	2010
Awarded for academic excellence.	

## Invited Seminars and Conference Presentations

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1. **Straub, A.P.** “Pressure-driven distillation using air-trapping membranes for fast and selective water desalination” *International Congress on Membranes*, Chiba, Japan. Oral presentation. July 14, 2023.

2. Lopez, K.; Jorgenson, N.; Nguyen, D.T.; Lee, S.; Summers, S.; **Straub, A.P.** “Applying pressure-driven distillation to water reuse: challenges and solutions” *International Congress on Membranes*, Chiba, Japan. Oral presentation. July 13, 2023.
3. Laris, O.; **Straub, A.P.** “Developing multifunctional hydrogel coatings for membranes” *International Congress on Membranes*, Chiba, Japan. Poster presentation. July 13, 2023.
4. **Straub, A.P.** Nguyen, D.T.; Lopez, K.P. Lee, S.; “Pressure-driven distillation for fast and selective water desalination” *2023 Association of Environmental Engineering and Science Professors (AEESP) Conference*, St. Louis, MO. Oral presentation. June 21, 2023
5. Nguyen, D.T.; Lopez, K.P.; Fan, S.; Ding, Y.; **Straub, A.P.** “Scalable polymeric membranes for pressure-driven distillation” *2023 Association of Environmental Engineering and Science Professors (AEESP) Conference*, Boston, MA. Oral presentation. June 21, 2023
6. Mungan, A.; Hjelvik, E.A.; **Straub, A.P.**, Korak, J. “Scalable polymeric membranes for pressure-driven distillation” *2023 Association of Environmental Engineering and Science Professors (AEESP) Conference*, Boston, MA. Poster presentation. June 21, 2023
7. Nguyen, D.; Lopez, K.L.; Fan, S.; Ding, Y.; Lee, J.; **Straub, A.P.** “High-performance scalable membranes for water desalination by pressure-driven distillation” *North American Membrane Society 2023 Meeting*, Tuscaloosa, AL. Oral presentation. May 17, 2023.
8. Lopez, K.; **Straub, A.P.** “Fouling behavior and mitigation vapor-gap reverse osmosis using nanoporous hydrophobic membranes” *2023 WaterReuse Colorado Conference*, Boulder, CO. Poster presentation. May 2, 2023.
9. Lee, S.; **Straub, A.P.** “Predicting contaminant rejection in reverse osmosis and nanofiltration with molecular fingerprints and data-driven models” *2023 WaterReuse Colorado Conference*, Boulder, CO. Poster presentation. May 2, 2023.
10. Nguyen, D.T.; **Straub, A.P.** “Pressure-driven distillation for ultra-selective and oxidation-resistant water purification” *2023 WaterReuse Colorado Conference*, Boulder, CO. Poster presentation. May 2, 2023.
11. Lopez, K.; Nguyen, D. Hjelvik, E.; Lee, S.; **Straub, A.P.** “Pressure-driven membrane distillation for high efficiency, selectivity, and oxidation resistance in desalination and wastewater reuse” *Membrane Science Engineering and Technology Center Spring 2023 Meeting*, State College, PA. Oral presentation. April 3, 2023.
12. Lopez, K.; **Straub, A.P.** “Electrochemical characterization and oxidation to mitigate failure in pressure-driven distillation” *AMTA/AWWA Membrane Technology Exposition (MTC23)*, Knoxville, TN. Oral presentation. February 21, 2023.
13. Lopez, K.; Nguyen, D. Hjelvik, E.; Lee, S.; **Straub, A.P.** “Pressure-driven membrane distillation for high efficiency, selectivity, and oxidation resistance in desalination and wastewater reuse” *Membrane Science Engineering and Technology Center Fall 2022 Meeting*, Boulder, CO. Oral presentation. October 24, 2022.
14. **Straub, A.P.**, “Putting bubbles to work: Next-generation water treatment systems using air-trapping membranes” *Texas Tech*, Lubbock, Texas. Invited Virtual Seminar. October 10, 2022.
15. Nguyen, D.; Lee, S.; Lopez, K.L.; Hernandez, M.; Lee, J.; **Straub, A.P.** “Next-generation Water Purification Systems: Pressure-driven Vapor Transport across Air-trapping Membranes” *263rd American Chemical Society National Meeting*, Chicago, IL. Oral presentation. August 23, 2022.
16. Lopez, K.; Nguyen, D.; Lee, S.; Hjelvik, E.; **Straub, A.P.** “Pressure-driven membrane distillation for high efficiency, selectivity, and oxidation resistance in desalination and wastewater reuse” *Membrane Science Engineering and Technology Center Fall 2022 Meeting*, Boulder, CO. Oral presentation. October 24, 2022.

17. Lee, S.; **Straub, A.P.** “Data-driven models learning molecular features to predict organic solute rejection in reverse osmosis and nanofiltration” *2022 Gordon Research Conference: Membrane Materials and Processes*, New London, NH. Poster presentation. July 30-August 5, 2022.
  18. Nguyen, D.; Lee, S.; Lopez, K.L.; Hernandez, M.; Lee, J.; **Straub, A.P.** “Pressure-driven Distillation for Water Purification with Ultrahigh Selectivity and Oxidation Tolerance” *2022 Gordon Research Seminar: Membrane Materials and Processes*, New London, NH. Oral presentation. July 30, 2022.
  19. Lee, S.; **Straub, A.P.** “Omniphobic membranes with high liquid entry pressure for separating organic solvents in pressure-driven distillation” *2022 Association of Environmental Engineering and Science Professors (AEESP) Conference*, St. Louis, MO. Poster presentation. June 28, 2022
  20. **Straub, A.P.**, “Putting bubbles to work: Next-generation reverse osmosis systems using air-trapping membranes” *Association of Environmental Engineering & Science Professors (AEESP) 2022*, St. Louis, Missouri. Oral presentation. June 27, 2022.
  21. Lopez, K.; Nguyen, D. Hjelvik, E.; Lee, S.; **Straub, A.P.** “Pressure-driven membrane distillation for high efficiency, selectivity, and oxidation resistance in desalination and wastewater reuse” *Membrane Science Engineering and Technology Center Spring 2022 Meeting*, Newark, NJ. Oral presentation. June 6, 2022.
  22. **Straub, A.P.**, “Ultraselective and oxidation-resistant pressure-driven desalination using nanobubble trapping membranes” *Tahoe Nanofluidics Conference*, Tahoe, California. Oral presentation. May 24, 2022.
  23. **Straub, A.P.**, “Putting bubbles to work: Next-generation water treatment systems using air-trapping membranes” *North American Membrane Society 2021 Conference*, Phoenix, Arizona. Oral presentation. May 18, 2022.
- Part of a special session for NAMS Awards***
24. Hjelvik, E.; Lopez, K.L.; **Straub, A.P.** “High Flux Vapor-Gap Membranes for Reverse Osmosis Via Informed Design Of Membrane Pore Structures” *North American Membrane Society 2022 Conference*, Phoenix, AZ. Poster presentation. May 18, 2022.
  25. Hjelvik, E.; Lopez, K.L.; **Straub, A.P.** “High Flux Vapor-Gap Membranes for Reverse Osmosis Via Informed Design Of Membrane Pore Structures” *North American Membrane Society 2022 Conference*, Phoenix, AZ. Oral presentation. May 18, 2022.
  26. Hjelvik, E.; Cairney, H.; Nguyen, D.; Karanikola, V.; **Straub, A.P.** “Impact Of Oxidative Chemicals On The Performance And Materials Properties Of Hydrophobic Porous Membranes Used In Membrane Distillation” *North American Membrane Society 2022 Conference*, Phoenix, AZ. Oral presentation. May 17, 2022.
  27. Lopez, K.; Wang, R.; Hjelvik, E.; Lin, S.; **Straub, A.P.** “Towards a universal framework for evaluating mass transport in pressure, concentration, and temperature driven membrane-based desalination systems” *North American Membrane Society 2022 Conference*, Phoenix, AZ. Oral presentation. May 17, 2022.
  28. Hjelvik, E.; Lopez, K.L.; **Straub, A.P.** “Increasing water supplies using novel distillation-based membrane technologies” *American Water Resources Association Conference*, Denver, CO. Oral presentation. February 20, 2022.
  29. **Straub, A.P.**, “Putting bubbles to work: Next-generation water treatment systems using air-trapping membranes” *Colorado School of Mines*, Golden, Colorado. Invited Seminar. October 22, 2021.
  30. Nguyen, D.T.; Lee, S.; Lopez, K.; Hernandez, M.; Lee, J.; **Straub, A.P.** “Ultra-selective and oxidation-resistant membranes for desalination and water reuse” *North American Membrane Society 2021 Conference*, Estes Park, Colorado. Oral presentation. September 2, 2021.

***Part of special session for student awards***

31. Lopez, K.; Nguyen, D.; **Straub, A.P** “Fouling behavior and mitigation in vapor-gap reverse osmosis using nanoporous hydrophobic membranes” *North American Membrane Society 2021 Conference*, Estes Park, Colorado. Poster presentation. September 2, 2021.
32. Lee, S.; **Straub, A.P** “Evaluation of volatile and semi-volatile organic compound transport across membrane distillation modules” *North American Membrane Society 2021 Conference*, Estes Park, Colorado. Poster presentation. September 2, 2021.
33. Cairney, H.; Nguyen, D.; Hjelvik, E.; Lopez, K.; **Straub, A.P** “Oxidation resistance of hydrophobic porous membranes used in membrane distillation” *North American Membrane Society 2021 Conference*, Estes Park, Colorado. Poster presentation. September 2, 2021.
34. Nguyen, D.T.; Lee, S.; Lopez, K.; Hernandez, M.; Lee, J.; **Straub, A.P** “Ultra-selective and oxidation-resistant Pressure-Driven Desalination using Entrapped Nanobubble Membranes” *American Chemical Society Fall 2021 Meeting*, Remote. Oral presentation. August 22, 2021.  
**Part of a student award**
35. Nguyen, D.T.; Lee, S.; Lopez, K.; Hernandez, M.; Lee, J.; **Straub, A.P** “Ultra-selective and oxidation-resistant membranes for desalination and water reuse” *AWWA/AMTA Membrane Technology Conference and Exposition*, West Palm Beach, Florida. Oral presentation. July 20, 2021.  
**Part of special session for AMTA student fellowship awardees**
36. Nguyen, D.T.; Lee, S.; Lopez, K.; Hernandez, M.; Lee, J.; **Straub, A.P** “Ultra-selective and oxidation-resistant membranes for desalination and water reuse” *AWWA/AMTA Webinar*, Remote. Oral presentation. March 25, 2021.  
**Part of special session for AMTA student fellowship awardees**
37. **Straub, A.P.**, “Putting bubbles to work: Emerging applications of hydrophobic membranes in water treatment and power generation” *WESTalks Seminar*, Remote. Invited Seminar. February 18, 2021.
38. Lee, S.; **Straub, A.P** “Opportunities for high productivity and selectivity desalination via osmotic distillation with improved membrane design” *North American Membrane Society 2020 Conference*. Virtual meeting. Oral presentation. May 21, 2020.
39. **Straub, A.P.**, “Nano-enabled Membrane Materials for Water Treatment and Power Generation” *University of British Columbia*, Vancouver, Canada. Invited Seminar. June 14, 2019.
40. **Straub, A.P.**; Bergsman, D.; Getachew, B.; Leahy, L.; Patel, J.; Ferralis, N.; and Grossman, J.C, “Electrically Conductive and Highly Permeable Nanocomposite Ultrafiltration Membranes Using Laser-Reduced Graphene Oxide” *Association of Environmental Engineering & Science Professors (AEESP) 2019*, Tempe, Arizona. Poster Presentation. May 15, 2019.
41. **Straub, A.P.** “Putting Bubbles to Work: Emerging Applications of Hydrophobic Membrane Materials in Power Generation and Desalination” *Ben-Gurion University of the Negev*, Midreshet Ben-Gurion, Israel. Invited Seminar. February 11, 2019.
42. **Straub, A.P.**, Grossman, J.E. “Functionalized graphene materials for membrane separations” *Gordon Research Conference, Membranes: Materials and Processes*, New London, NH. Poster Presentation. August 13, 2018.
43. **Straub, A.P.**, Elimelech, M. “Energy Efficiency and Performance Limiting Effects in Thermo-Osmotic Energy Conversion from Low-Grade Heat” *Association of Environmental Engineering & Science Professors (AEESP) 2017 Conference*, Ann Arbor, MI. Oral Presentation. June 22, 2017.
44. **Straub, A.P.**, Deshmukh, A., Elimelech, M. “Net Energy Output of Salinity Gradient Power Generation with Pressure-Retarded Osmosis: What Configurations Are Feasible?” *American Chemical Society (ACS) National Conference*, Philadelphia, PA. Oral Presentation. August 24, 2016.  
**Received Best Presentation Award**

45. **Straub, A.P.**, Yip, N.Y., Lin, S., Lee, J., Elimelech, M. “Harvesting Low-Grade Heat Using Thermo-Osmotic Vapor Transport Through Nanoporous Membranes” *Gordon Research Seminar, Membranes: Materials and Processes*, New London, NH. Oral Presentation. July 30, 2016.
46. **Straub, A.P.**, Deshmukh, A., Elimelech, M. “Power Generation from Salinity Gradients by Pressure-Retarded Osmosis: Is It Viable?” *INES Network for Salinity Gradient Energy Webinar*. Oral Presentation. January 25, 2016.
47. **Straub, A.P.**, Lin, S., Elimelech, M. “Power Generation from Salinity Gradients by Pressure-Retarded Osmosis: Is It Viable?” *New England Graduate Student Water Symposium*, Amherst, MA. Oral Presentation. September 12, 2015
48. **Straub, A.P.**, Lin, S., Elimelech, M. “Power Generation from Salinity Gradients by Pressure-Retarded Osmosis: How Much Energy Can We Extract?” *Association of Environmental Engineering & Science Professors (AEESP) 2015 Conference*, New Haven, CT. Oral Presentation. June 15, 2015  
**Received Best Presentation Award**
49. **Straub, A.P.**, Lin, S., Elimelech, M. “Performance Limitations of Pressure-Retarded Osmosis: Experimental Characterization and Module-Scale Analysis” *North American Membrane Society 25<sup>th</sup> Annual Meeting*, Boston, MA. Oral Presentation. June 1, 2015
50. **Straub, A.P.**, Lin, S., Elimelech, M. “Power Generation by Pressure-Retarded Osmosis: How Much Energy Can We Extract?” *International Forward Osmosis Association World Summit*, Lisbon, Portugal. Oral Presentation. September 18-19, 2014.
51. **Straub, A.P.**, Yip, N.Y., Elimelech, M. “Realizing High Power Density in Pressure-Retarded Osmosis with Increased Hydraulic Pressure.” *Gordon Research Conference, Membranes: Materials and Processes*, New London, NH. Poster Presentation. July 6-11, 2014.
52. **Straub, A.P.**, Lin, S., Yip, N.Y., Elimelech, M. “Limits of Extractable Energy and Power Density in Pressure-Retarded Osmosis.” *INES Network for Salinity Gradient Energy Meeting*, Montreal, Canada. Oral Presentation. June 10, 2014.
53. **Straub, A.P.**, Yip, N.Y., Elimelech, M. “Realizing High Power Density in Pressure-Retarded Osmosis with Increased Hydraulic Pressure.” *North American Membrane Society 24<sup>rd</sup> Annual Meeting*, Houston, TX. Oral Presentation. June 4, 2014.
54. **Straub, A.P.**, Yip, N.Y., Elimelech, M. “Realizing High Power Density in Pressure-Retarded Osmosis with Increased Hydraulic Pressure.” *11<sup>th</sup> Annual Robert M. Langer Symposium*, New Haven, CT. Oral Presentation. December 6, 2013.  
**Received Best Presentation Award**
55. Tirafferi, A., Yip, N.Y., **Straub, A.P.**, Romero-Vargas Castrillon, S., Elimelech, M. “Novel Characterization Method for Determination of Transport and Structural Parameters of Forward Osmosis Membranes.” *North American Membrane Society 23rd Annual Meeting*, Boise, ID. Oral Presentation. June 11, 2013.
56. Bradley, I., **Straub, A.P.**, Sohn, A., Folwarski, P., and Nguyen, T.H. “Iron Amended Biosand Filters for Virus Removal.” *WEFTEC 2010 Design Competition*, New Orleans, LA. Oral Presentation. October 3, 2010.
57. **Straub, A.P.**, Sohn A., Bradley, I., and Nguyen, T.H., “Virus Removal in Iron Amended Biosand Filters.” *UIUC Environmental Engineering and Sciences Symposium*, Champaign, IL. Oral Presentation. April 2, 2010

## Contracts and Grants

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12 grants award (8 awarded as PI)

Total funding to Straub Group: Approximately \$1,674,161



**Grants Awarded as PI (Total: \$1,818,097; Total to Straub: \$1,359,789)**

1. Title: Nanofiltration and oxidation for improved concentration of short, ultrashort, and neutral PFASs  
Funding Agency: Membrane Science, Engineering and Technology Research Center with U.S. Army  
PI: Anthony Straub  
Total Award: \$54,000 (no overhead)  
Straub Award: \$54,000  
Award Duration: 1 year (2023)
2. Title: High performance “nanobubble” membranes enabled by electrochemical characterization  
Funding Agency: University of Colorado Boulder, Environmental Engineering Seed Grant  
PI: Anthony Straub  
Total Award: \$33,333  
Straub Award: \$16,666  
Award Duration: 1 years (2023)
3. Title: GOALI: Integrated Oxidation Vapor-Gap Reverse Osmosis Systems for Water Reuse  
Funding Agency: National Science Foundation  
PI: Anthony Straub  
Co-PI: Daniel McCurry (University of Southern California).  
Total Award: \$499,999  
Straub Award: \$262,131  
Award Period: 3 years (2022-2024)
4. Title: NSF-BSF: Ion transport and selectivity in salt-rejecting membranes operating at elevated salinities and pressures  
Funding Agency: National Science Foundation  
PI: Anthony Straub  
Co-PIs: Michael Shirts (CU Boulder), Razi Epsztein (Technion)  
Total Award: \$461,765  
Straub Award: \$257,992  
Award Duration: 3 years (2022-2024)
5. Title: Simplified water reuse and highly selective desalination using pressure-driven membrane distillation  
Funding Agency: Department of Interior, Bureau of Reclamation  
PI: Anthony Straub  
Total Award: \$250,000  
Straub Award: \$250,000  
Award Duration: 2 years (2022-2024)
6. Title: Application of a novel distillation reverse osmosis process to reduce mass and improve performance in spacecraft and planetary water recovery systems  
Funding Agency: National Aeronautics and Space Administration (NASA)  
PI: Anthony Straub  
Total Award: \$240,000  
Straub Award: \$240,000  
Award Duration: 3 years (2022-2024)
7. Title: Insect-mimicking membranes for robust desalination and industrial separations  
Funding Agency: University of Colorado Boulder, Research and Innovation Office; Seed Grant

PI: Anthony Straub  
Total Award: \$50,000  
Straub Award: \$50,000  
Award Duration: 1.5 years (2021-2022)

8. Title: Osmotic membranes with near-perfect selectivity and improved chemical resilience for wastewater reuse  
Funding Agency: Membrane Science, Engineering and Technology Research Center  
PI: Anthony Straub  
Total Award: \$229,000 (no overhead)  
Straub Award: \$229,000  
Award Duration: 4 years (2020-2024) — Renewed funding after reapplying each year

**Grants Awarded as Co-PI (approximate total to Straub: \$314,372)**

1. Title: 222 nm KrCl\* Driven Advanced Oxidation for Reverse Osmosis Pretreatment: Fouling Control and Chemical/Pathogen Abatement  
PI: Karl Linden  
Co-PIs: Anthony Straub and Daniel McCurry (University of Southern California)  
Funding Agency: National Alliance for Water Innovation  
Total Award: \$668,270  
Straub Award: \$150,000 (approximate)  
Award Duration: 2 years (2022-2024)
2. Title: Mobile Test Bed for Marginal Water Filtration  
Funding Agency: National Alliance for Water Innovation.  
PI: Michael Watts (Garver)  
Co-PIs: Anthony Straub (CU Boulder and others at City of Rio Rancho, NX Filtration, WaterTectonics, Rockwell Automation, Powell Water, and UCLA)  
Total Award: \$1,254,841  
Straub Award: \$44,372  
Award Duration: 1.5 years (2022-2023)
3. Title: Unlocking the Nationwide Potential of Water Reuse  
Funding Agency: Environmental Protection Agency  
PI at CU Boulder: Karl Linden  
Co-PIs at CU Boulder: Scott Summers, Julie Korak, Sheldon Masters, Cresten Mansfeldt, Amy Javernick-Will, Sherri Cook.  
Total Award: \$3,245,999  
Straub Award: \$50,000 (Approximate)  
Award Duration: 4 years (2022-2026)
4. Title: Tunable salt rejection membranes for enhanced energetics and high recovery in brackish water desalination  
Funding Agency: Department of Interior, Bureau of Reclamation  
PI: Vasiliki Karanikola (University of Arizona)  
Co-PIs: Anthony Straub (CU Boulder) and Kerri Hickenbottom (University of Arizona)  
Total Award: \$150,000  
Straub Award: \$70,000  
Award Duration: 2.5 years (2021-2023)

**Grants Pending**

1. Title: PFI-TT: Scaling Up Pressure-Driven Distillation for Ultrasensitive and Efficient Water Purification  
PI: Anthony Straub  
Funding Agency: National Science Foundation  
Total Award: \$550,000  
Straub Award: \$550,000  
Award Duration: 2 years
2. Title: Selective Concentration of PFAS-Impacted Matrices Using Tailored Membrane Filtration with Pretreatment  
Funding Agency: Dept. of Defense SERDP  
PI: Anthony Straub  
Co-PIs: Kyle Doudrick (University of Notre Dame)  
Total Award: \$798,000  
Straub Award: \$400,000  
Award Duration: 3 years

## Teaching

### Courses Taught

Course	Semester	Level	Type	Enrollment
CVEN 3414: Fundamentals of Environmental Engineering	Fall 2019	Sophomore	Required	93
CVEN 3414: Fundamentals of Environmental Engineering	Spring 2020	Sophomore	Required	20
CVEN 5464: Environmental Engineering Processes	Fall 2020	Graduate	Required	32
CVEN 3414: Fundamentals of Environmental Engineering	Spring 2021	Sophomore	Required	67
CVEN 5464: Environmental Engineering Processes	Fall 2021	Graduate	Required	39
CVEN 5834: Advanced Physical-Chemical Processes for Water Treatment*	Fall 2021	Graduate	Elective	12
CVEN 3414: Fundamentals of Environmental Engineering	Spring 2022	Sophomore	Required	60
CVEN 5464: Environmental Engineering Processes	Fall 2022	Graduate	Required	25
CVEN 3414: Fundamentals of Environmental Engineering	Spring 2023	Sophomore	Required	41
CVEN 5464: Environmental Engineering Processes	Fall 2023	Graduate	Required	39
CVEN 6504: Advanced Physical-Chemical Processes for Water Treatment*	Fall 2023	Graduate	Elective	13

\*Co-taught between four instructors

### Course Descriptions

#### CVEN 3414: Fundamentals of Environmental Engineering

3 credit hour junior-level undergraduate course covering broad topics related to environmental engineering. Course is required for all environmental engineering undergraduate students.

#### CVEN 5464: Environmental Engineering Processes

3 credit hour graduate course covering reactor design and mass transfer. Course is required for all environmental engineering graduate students.

#### CVEN 5834/6504: Advanced Physical-Chemical Processes for Water and Water Reuse Treatment

3 credit hour graduate course covering ion exchange, advanced oxidation process. Enrollment ranges from 25–40 students.

## Other Teaching

### University of Colorado Water Reuse Short Course

Taught a module on membrane processes for a University of Colorado Water Reuse short course held virtually. The course was attended to by water industry professionals and academics.

## Teaching Certificates

### MIT Kaufman Teaching Certificate

Jan. 2019 – May 2019

Semester-long training program designed at developing skills in teaching and course planning. Includes eight workshops and additional teaching sessions.

## Student Advising

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### Primary Graduate Research Mentor

9 current graduate students (8 Ph.D. students and 1 M.S. student); 1 Ph.D. graduated

#### Current Graduate Students

**Ph.D.** Kian Lopez, Chem. Eng., *NASA NSTGRO Fellowship Awardee*

Trisha Nickerson, Chem. Eng., Co-advised with Michael Toney, *NSF GRFP Awardee*

Elizabeth Hjervik, Mat. Sci., *NSF GRFP Awardee*

Omar Laris, Mat. Sci.

Duong Nguyen, Env. Eng.

Sasha Neefe, Chem. Eng., Co-advised with Michael Toney

Mohammad Allouzi, Env. Eng.

Yukai Tomsovic, Mat. Sci.

**M.S.** Hannah Cairney, Env. Eng.

#### Graduate Student Alumni

**Ph.D.** Sangsuk Lee, Ph.D., Env. Eng. 2023

Current position: Postdoctoral researcher at University of California Los Angeles

### Primary Undergraduate Research Mentor

Jacqueline Hall, Env. Eng. (May 2022 – Present)

Maggie Holland, Env. Eng. (May 2023 – Dec. 2023)

Divyanshi Mishra, Mech. Eng. (Jan. 2023 – May 2023)

Teo Hueske-Vanceylon, Mech. Eng. (Jan. 2023 – May 2023)

Lewis Salvesson, Env. Eng. (Nov. 2021 – May 2023)

Sonrisa Macharia, Env. Eng. (Sept. 2019 – May 2020)

Hannah Cairney, Env. Eng. (Sept. 2019 – May 2022)

### Committee Member (outside of primary research group)

Served on 12 Ph.D. thesis committees (2 Env. Eng.; 3 Mat. Sci.; 6 Mech. Eng.; 1 Chem. Eng.)

Served on 14 preliminary exam or M.S. thesis committees.

## Professional Service

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### Reviewer for Scholarly Journals (approximately 20 per year)

ACS Applied Materials & Interfaces, ACS Energy Letters, ACS Nano, Applied Energy, Desalination, Environmental Science & Technology, Environmental Science & Technology Letters, Environmental Science & Technology Engineering, Environmental Science: Water Research & Technology, Joule, Journal of Chemical Physics, Journal of the Electrochemical Society, Journal of Membrane Science, Journal of Water Process Engineering, Nano Letters, Nature Communications, Nature

Nanotechnology, Nature Water, Physics of Fluids, Science Advances, Separation & Purification Technology, Sustainable Energy & Fuels

### **Grant Review Panels**

U.S.-Egypt Science and Technology Joint Fund. May 2022.

University of Colorado Research & Innovation Office Seed Grant Program. Spring 2022 and 2023

BARD: The US-Israel Agricultural Research & Development Fund. November 2021.

NSF CBET Molecular Separations Panel, Washington, D.C. September 2019.

### **Professional Memberships**

American Chemical Society (ACS), American Institute of Chemical Engineers (AIChE), Association of Environmental Engineering & Sciences Professors (AEESP), North American Membrane Society (NAMS), Water Environment Foundation (WEF)

### **Conference Organizing**

2023 International Congress on Membranes, Session Chair for Desalination Session

2023 Association of Environmental Engineering and Sciences Professors Conference, Moderator for Desalination Session

2022 North American Membrane Society Conference: Session Chair for “Osmotic Processes”

2021 North American Membrane Society Conference: Social media coordinator

2021 North American Membrane Society Conference: Session Chair for “Osmotically Driven Processes”

2020 North American Membrane Society Conference: Session Chair for “Osmotically Driven Processes”

2019 North American Membrane Society Conference: Session Chair for “Osmotically Driven Processes”

### **Press Interviews**

Interviewed for *Popular Science* article “Estuaries could power us to a low-carbon future” published on 23 June 2021.

Interviewed for *Scientific American* article “[This Battery Runs on the Hidden Power of Estuaries](#)” published on 1 March 2017.