YANG HAN

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EDUCATION

Ph.D. Chemical Engineering, The Ohio State University, Columbus, Ohio GPA:4.00 2018
Dissertation: "Facilitated Transport Membranes for Post-combustion Carbon Capture and H_2 Purification: From Membrane Synthesis to Process Design"
Advisor: Dr. W.S. Winston Ho

B.S. Chemical Engineering, Tianjin University, Tianjin, China GPA:3.90 2011

RESEARCH INTERESTS

Molecular separation, polymeric membrane, carbon capture, hydrogen purification, chemical separation, energy sustainability, facilitated transport, electrochemical CO_2 reduction, process intensification, numerical modeling.

RESEARCH AND PROFESSIONAL EXPERIENCE

The Ohio State University, Columbus, OH 2019–present
Research Scientist, Department of Chemical and Biomolecular Engineering
- Structure–property engineering of polymers for molecular separations
- Membrane-based approach for debottlenecking energy-intensive separations, including CO_2 capture, H_2 purification, olefin/paraffin separation, and aromatic/saturate separation

The Ohio State University, Columbus, OH 2013–2018
Graduate Research Associate, Department of Chemical and Biomolecular Engineering
- Facilitated transport mechanism, aminopolymer synthesis, and amine–CO_2 chemistry
- Roll-to-roll membrane fabrication, modular fabrication, and process prototype upscaling

Tianjin University, Tianjin, China 2011–2013
Research Assistant, School of Chemical Engineering
- Lattice Boltzmann method for large-eddy simulation in biofilm pore structures

Tianjin University, Tianjin, China 2007–2011
Undergraduate Researcher, School of Chemical Engineering
- Cellular automata model to study heterogeneity in biofilms

TEACHING EXPERIENCE

Guest Lecturer, Polymeric Membranes (ChBE 5574), The Ohio State University, Fall 2019. Delivered lectures on membrane materials and membrane preparation, selection of membrane process, and gas separation.

Teaching Assistant, Advanced Transport Phenomena (ChBE 8815), The Ohio State University, Falls 2015–2018. Held office hours, led review sessions, delivered lectures, and designed exams.

Instruction Assistant, Advanced Kinetics (ChBE 8812), The Ohio State University, Spring 2015. Conducted office hours, assessed assignments and exams, and contributed to the development of exam questions.

JOURNAL PUBLICATIONS (CITATIONS = 1492, H-INDEX = 20. SEE GOOGLE SCHOLAR PAGE FOR UPDATES)

2024

1. Y. Yang, **Y. Han**, C. Zou, R. Pang, J. Hu, K. Chen, and W.S.W. Ho, "A Commercial-size Prototype of Countercurrent Spiral-wound Membrane Module for Flue Gas CO_2 Capture", Journal of Membrane Science, 696, 122520 (2024).

2023

2. S. Rao, **Y. Han**, and W.S.W. Ho, "H_2S/CO_2 Separation Using Sterically Hindered Amine Membranes", Journal of Membrane Science, 686, 121989 (2023).
3. S. Rao, **Y. Han**, and W.S.W. Ho, "Polymeric Membranes for H_2S and CO_2 Removal from Natural Gas for Hydrogen Production: A Review", Energies, 16(15), 5713 (2023). (invited)

2022

4. X. Deng, **Y. Han**, L.-C. Lin, and W.S.W. Ho, "A New Measurement of Amine Steric Hindrance–N Exposure", Separation and Purification Technology, 299, 121601 (2022).
5. S. Rao, **Y. Han**, and W.S.W. Ho, "Recent Advances in Polymeric Membranes for Carbon Dioxide Capture from Syngas", Separation Science and Technology, 58(6), 1050–1071 (2022). (invited)
6. R. Pang, Y. Yang, **Y. Han**, K.K. Chen, and W.S.W. Ho, "Bicontinuous Substrates with Reduced Pore Restriction for CO_2-Selective Composite Membranes", Journal of Membrane Science, 654, 120547 (2022). (Editor's Choice)
7. X. Deng, **Y. Han**, L.-C. Lin, and W.S.W. Ho, "Computational Prediction of Water Sorption in Facilitated Transport Membranes", The Journal of Physical Chemistry C, 126, 3661–3670 (2022).
8. R. Pang, **Y. Han**, K.K. Chen, Y. Yang, and W.S.W. Ho, "Matrimid Substrates with Bicontinuous Surface and Macrovoids in the Bulk: A Nearly Ideal Substrate for Composite Membranes in CO_2 Capture", Applied Energy, 311, 118624 (2022). (invited)
9. **Y. Han** and W.S.W. Ho, "Moving beyond 90% Carbon Capture by Highly Selective Membrane Processes", Membranes, 12, 399 (2022). (invited)
10. **Y. Han** and W.S.W. Ho, "Mitigated Carrier Saturation of Facilitated Transport Membranes for Decarbonizing Dilute CO_2 Sources: An Experimental and Techno-Economic Study", Journal of Membrane Science Letters, 2, 100014 (2022). (invited)

2021

11. Z. Zhang, S. Rao, **Y. Han**, R. Pang, and W.S.W. Ho, "CO_2-selective Membranes Containing Amino Acid Salts for CO_2/N_2 Separation", Journal of Membrane Science, 638, 119696 (2021).
12. **Y. Han** and W.S.W. Ho, "Facilitated Transport Membranes for H_2 Purification from Coal-derived Syngas: A Techno-Economic Analysis", Journal of Membrane Science, 636, 119549 (2021). (invited)
13. **Y. Han** and W.S.W. Ho, "Polymeric Membranes for CO_2 Separation and Capture", Journal of Membrane Science, 628, 119244 (2021). (invited)
14. K.K. Chen, **Y. Han**, Z. Zhang, and W.S.W. Ho, "Enhancing Membrane Performance for CO_2 Capture from Flue Gas with Ultrahigh MW Polyvinylamine", Journal of Membrane Science, 628, 119215 (2021).
15. K.K. Chen, **Y. Han**, Z. Tong, M. Gasda, and W.S.W. Ho, "Membrane Processes for CO_2 Removal and Fuel Utilization Enhancement for Solid Oxide Fuel Cells", Journal of Membrane Science, 620, 118846 (2021).

2020

16. X. Deng, C. Zou, **Y. Han**, L.-C. Lin, and W.S.W. Ho, "Computational Evaluation of Carriers in Facilitated Transport Membranes for Postcombustion Carbon Capture", The Journal of Physical Chemistry C, 124(46), 25322–25330 (2020).
17. Y. Yang, **Y. Han**, and W.S.W. Ho, "Amine-containing Membranes with Functionalized Multi-walled Carbon Nanotubes for CO_2/H_2 Separation", Membranes, 10(11), 333 (2020). (invited)
18. K.K. Chen, W. Salim, **Y. Han**, M. Gasda, W.S.W. Ho, "Fluoride- and Hydroxide-containing CO_2-selective Membranes for Improving H_2 Utilization of Solid Oxide Fuel Cells", Journal of Membrane Science, 612, 118484 (2020).
19. R. Pang, K.K. Chen, **Y. Han**, W.S.W. Ho, "Highly Permeable Polyethersulfone Substrates with Bicontinuous Structure for Composite Membranes in CO_2/N_2 Separation", Journal of Membrane Science, 612, 118443 (2020). (Editor's Choice)
20. **Y. Han**, Y. Yang, and W.S.W. Ho, "Recent Progress in the Engineering of Polymeric Membranes for CO_2 Capture from Flue Gas", Membranes, 10(11), 365 (2020). (invited)
21. **Y. Han**, and W.S.W. Ho, "Recent Advances in Polymeric Facilitated Transport Membranes for Carbon Dioxide Separation and Hydrogen Purification", Journal of Polymer Science, 58(18), 2435–2449 (2020). (invited)
22. **Y. Han**, and W.S.W. Ho, "Recent Developments on Polymeric Membranes for CO_2 Capture from Flue Gas", Journal of Polymer Engineering, 40(6), 529–542 (2020). (invited)
23. **Y. Han**, and W.S.W. Ho, "Design of Amine-containing CO_2-selective Membrane Process for Carbon Capture from Flue Gas", Industrial & Engineering Chemistry Research, 59, 5340–5350 (2020). (invited)

2019

24. **Y. Han**, W. Salim, K.K. Chen, D. Wu, and W.S.W. Ho, "Field Trial of Spiral-wound Facilitated Transport Membrane Module for CO_2 Capture from Flue Gas", Journal of Membrane Science, 575, 242–251 (2019).
25. **Y. Han**, D. Wu, and W.S.W. Ho, "Simultaneous Effects of Temperature and Vacuum and Feed Pressures on Facilitated Transport Membrane for CO_2/N_2 Separation", Journal of Membrane Science, 573, 476–484 (2019).
26. K.K. Chen, W. Salim, **Y. Han**, D. Wu, and W.S.W. Ho, "Fabrication and Scale-up of Multi-leaf Spiral-wound Membrane Modules for CO_2 Capture from Flue Gas", Journal of Membrane Science, 595, 117504 (2019).
27. W. Salim, **Y. Han**, V. Vakharia, D. Wu, D.J. Wheeler, and W.S.W. Ho, "Scale-up of Amine-containing Membranes for Hydrogen Purification for Fuel Cells", Journal of Membrane Science, 573, 465–475 (2019).
28. **Y. Han** and Z. Zhang, "Nanostructured Membrane Materials for CO_2 Capture: A Critical Review", Journal of Nanoscience and Nanotechnology, 19(6), 3173–3179 (2019).

2018 and earlier

29. **Y. Han**, D. Wu, and W.S.W. Ho, "Nanotube-reinforced Facilitated Transport Membrane for CO_2/N_2 Separation with Vacuum Operation", Journal of Membrane Science, 567, 261–271 (2018).
30. **Y. Han** and W.S.W. Ho, "Recent Advances in Polymeric Membranes for CO_2 Capture", Chinese Journal of Chemical Engineering, 26, 2238–2254 (2018). (invited)
31. D. Wu, **Y. Han**, W. Salim, K.K. Chen, J. Li, and W.S.W. Ho, "Hydrophilic and Morphological Modification of Nanoporous Polyethersulfone Substrates for Composite Membranes in CO_2 Separation", Journal of Membrane Science, 565, 439–449 (2018).
32. D. Wu, **Y. Han**, L. Zhao, W. Salim, V. Vakharia, and W.S.W. Ho, "Scale-up of Zeolite-Y/Polyethersulfone Substrate for Composite Membrane Fabrication in CO_2 Separation", Journal of Membrane Science, 562, 56–66 (2018).

33. W. Salim, V. Vakharia, Y. Chen, D. Wu, **Y. Han**, and W.S.W. Ho, "Fabrication and Field Testing of Spiral-wound Membrane Modules for CO_2 Capture from Flue Gas", Journal of Membrane Science, 556, 126–137 (2018).
34. V. Vakharia, W. Salim, D. Wu, **Y. Han**, Y. Chen, L. Zhao, and W.S.W. Ho, "Scale-up of Amine-containing Thin-film Composite Membranes for CO_2 Capture from Flue Gas", Journal of Membrane Science, 555, 379–387 (2018).
35. H. Bai, Y. Kang, H. Quan, **Y. Han**, J. Sun, and Y. Feng, "Bioremediation of Copper-containing Wastewater by Sulfate Reducing Bacteria Coupled with Iron", Journal of Environmental Management, 129, 350–356 (2013).
36. H. Bai, **Y. Han**, Y. Kang, J. Sun, "Removal of Cu (II) and Fe (III) from Aqueous Solutions by Dead Sulfate Reducing Bacteria", Frontiers of Chemical Science and Engineering, 7(2), 177–184 (2013).
37. H. Bai, Y. Kang, H. Quan, **Y. Han**, J. Sun, Y. Feng, "Treatment of Acid Mine Drainage by Sulfate Reducing Bacteria with Iron in Bench Scale Runs", Bioresource Technology, 128, 818–822 (2013).
38. H. Bai, Y. Kang, H. Quan, **Y. Han**, Y. Feng, "Treatment of Copper Wastewater by Sulfate Reducing Bacteria in the Presence of Zero Valent Iron", International Journal of Mineral Processing, 112, 71–76 (2012).

BOOKS AND BOOK CHAPTERS

1. L. Ansaloni, **Y. Han**, T.A. Peters, and W.S.W. Ho, "Membrane Technology for CO_2 Capture Processes", in Carbon Capture and Storage: A Comprehensive Guide, S. Roussanaly and R. Anantharaman (Eds.), Elsevier, *in press*.
2. **Y. Han**, Y. Yang, and W.S.W. Ho, "Polymeric Membranes for CO_2 Capture", in Scholarly Community Encyclopedia, https://encyclopedia.pub/4200 (2020). (invited)

PATENTS

Issued Patents

1. W.S.W. Ho and Y. Han, "Membranes for Gas Separation", U. S. Patent 11,772,052 (10/3/2023).
2. W.S.W. Ho and Y. Han, "Methods for the Separation of CO_2 from a Gas Stream", Canadian Patent 2,987,592 (9/19/2023).
3. W.S.W. Ho, D. Wu, and Y. Han, "Membranes for Gas Separation", Japanese Patent 7,271,508 (4/28/2023).
4. W.S.W. Ho and Y. Han, "Methods for the Separation of CO_2 from a Gas Stream", U. S. Patent 11,358,093 (6/14/2022).

Patent Applications

5. W.S.W. Ho and Y. Han, "Gas Permeable Membranes and Methods of Using Thereof" (syngas), PCT Application No. PCT/US2019/058331 (filed 10/28/2019); U. S. Provisional Patent Application No. 62/751,529 (filed 10/26/2018).
6. W.S.W. Ho and Y. Han, "CO_2 Utilization for CO Production via Fuel Cell Enabled by CO_2-selective Membrane", PCT Publication No. WO 2021/041581 (3/4/2021); PCT Application No. PCT/US2020/048055 (filed 8/26/2020); U. S. Provisional Patent Application No. 62/891,811 (filed 8/26/2019).
7. W.S.W. Ho and Y. Han, "Guanidine-containing Membranes and Methods of Using Thereof", U. S. Patent Application Publication No. US2022/0305436 (9/29/2022); PCT Publication No. WO 2020/240522 (12/3/2020); PCT Application No. PCT/IB2020/055179 (filed 6/1/2020); U. S. Patent Application No. 17/615,503 (filed 11/30/2021 with the priority date of 6/1/2020).

8. W.S.W. Ho and Y. Han, "Crosslinked Facilitated Transport Membrane for Hydrogen Purification from Coal-derived Syngas", PCT Application No. PCT/US2021/023031(filed 3/18/2021); U. S. Provisional Patent Application No. 63/026,627 (filed 5/18/2020).
9. W.S.W. Ho and Y. Han, "Alkanolamine-containing Membranes and Methods of Making and Using Thereof", PCT Application No. PCT/US2023/060767 (filed 1/17/2023); U. S. Provisional Patent Application No. 63/300,450 (filed 1/18/2022).
10. Y. Han, S. Rao, and W.S.W. Ho, "Membranes for the Separation of H_2S from H_2S-CO_2 Mixtures", PCT Application No. PCT/US2023/061538 (filed 1/30/2023); U. S. Provisional Patent Application No. 63/325,429 (filed 3/30/2022).
11. Y. Han, J. Hu, and W.S.W. Ho, "Polyamidine-containing Membranes for CO_2 Separation from Gaseous Streams", PCT Application No. PCT/US2023/063348 (filed 2/27/2023); U. S. Provisional Patent Application No. 63/335,496 (filed 4/27/2022).
12. Y. Han, J. Hu, and W.S.W. Ho, "Polyguanidine-containing Membranes and Methods of Using Thereof", U. S. Provisional Patent Application No. 63/405,825 (filed 9/12/2022).
13. W.S.W. Ho, Y. Han, and Y.-C Huang, "Membrane-adsorption Process For Direct Air Capture", U. S. Provisional Patent Application No. 63/466,619 (filed 5/15/2023).
14. W.S.W. Ho, R. Pang, and Y. Han, "Polymeric Substrates and Methods of Making and Using Thereof", U. S. Provisional Patent Application No. 63/584,569 (filed 9/22/2023).
15. W.S.W. Ho, Y. Han, and R. Pang, "Fabrication of Polyethersulfone Substrates Using a Novel Cosolvent and Pore Former for Composite Membranes in Gas Separation", U. S. Provisional Patent Application No. 63/564,351 (filed 3/12/2024).
16. Y. Han and W.S.W. Ho, "Thin-film Composite Membrane Formation with Polyguanidine", U. S. Provisional Patent Application No. 63/564,357 (filed 3/12/2024).
17. Y. Han and W.S.W. Ho, "Enhancing Membrane Stability through Utilization of High-molecular-weight Polyguanidine", U. S. Provisional Patent Application No. 63/564,363 (filed 3/12/2024).
18. W.S.W. Ho and Y. Han, "Fabrication of Polyguanidine-Containing Membranes for CO_2 Separation from Gaseous Streams", U. S. Provisional Patent Application No. 63/564,369 (filed 3/12/2024).

PRESENTATIONS

Invited Talks

1. Y. Han, "Innovating Membranes for Energy-Efficient Gas Separations", Department of Chemical and Biological Engineering Seminar, University of Alabama, Tuscaloosa, AL, 4/8/2024.
2. Y. Han, "Innovating Membranes for Energy-Efficient Gas Separations", Department of Chemical and Petroleum Engineering Seminar, University of Kansas, Lawrence, KS, 4/2/2024.
3. Y. Han, "Innovating Membranes for Energy-Efficient Gas Separations", MizzouForward Keynote, University of Missouri, Columbia, MO, 3/21/2024.
4. Y. Han, "Innovating Membranes for Energy-Efficient Gas Separations", William A. Brookshire Department of Chemical and Biomolecular Engineering Seminar, University of Houston, Houston, TX, 2/29/2024.
5. Y. Han, "Innovating Membranes for Energy-Efficient Gas Separations", Cain Department of Chemical Engineering Seminar, Louisiana State University, Baton Rouge, LA, 2/8/2024.
6. Y. Han, "Innovating Membranes for Energy-Efficient Gas Separations", Department of Chemical and Biomolecular Engineering Seminar, New York University, New York City, NY, 1/22/2024.
7. Y. Han, "Innovating Membranes for Energy-Efficient Gas Separations", Department of Chemical and Environmental Engineering Seminar, Yale University, New Haven, CT, 1/18/2024.

8. Y. Han, L.-C. Lin, W.S.W. Ho, "Novel Transformational Membranes and Process for CO_2 Capture from Flue Gas", National Carbon Capture Center Biannual Project Review Meeting, Birmingham, AL, 5/17/2023.
9. Y. Han, L.-C. Lin, W.S.W. Ho, "Deep Dive: Novel Transformational Membranes and Process for CO_2 Capture from Flue Gas", National Carbon Capture Center Biannual Project Review Meeting, Wilsonville, AL, 5/16/2023.
10. Y. Han, "CCS State of the Art: Polymeric Membranes for CO_2 Capture and H_2 Purification", Battelle, 8/25/2022. (*virtual*)
11. Y. Han and W.S.W. Ho, "Unprecedented CO_2/H_2 Selectivity and CO_2 Permeance Demonstrated in Facilitated Transport Membranes with Tunable Amine-CO_2 Chemistry", NAMS Annual Meeting, Pittsburg, PA, 5/15/2019. (*Young Membrane Scientist Award Session*)

Conference Presentations

12. Y. Han, Y. Yang, B. Prasad, R. Pang, and W.S.W. Ho, "Carbon Capture from Flue Gases Using an Integrated Membrane Skid at ~1 Tonne CO_2/Day Scale", Paper 285e, AIChE 2023 Annual Meeting, Orlando, FL, 11/17/2023.
13. S. Li, Y. Han, W.S.W. Ho, T. Tamale, W. Xu, T. Pyrzynski, M. Stevens, H. Meyer, A. Sexton, and W. Morris, "Engineering Scale Design and Testing of Transformational Membrane Technology for CO_2 Capture", 2023 Carbon Management Research Project Review Meeting, Pittsburgh, PA, 8/30/2023.
14. Y. Han, Y. Yang, B. Prasad, R. Pang, and W.S.W. Ho, "Carbon Capture from Flue Gases Using an Integrated Membrane Skid at ~1 Tonne CO_2/Day Scale", NAMS Annual Meeting, Tuscaloosa, AL, 5/15/2023.
15. Y. Han, Y. Yang, R. Pang, and W.S.W. Ho, "Integrated Facilitated Transport Membrane Modules for Highly Selective Syngas Purification and Carbon Capture", Paper 278a, AIChE 2022 Annual Meeting, Phoenix, AZ, 11/15/2022.
16. Y. Han and W.S.W. Ho, "Mitigated Carrier Saturation of Facilitated Transport Membranes for Decarbonizing Dilute CO_2 Sources", Paper 343d, AIChE 2022 Annual Meeting, Phoenix, AZ, 11/15/2022.
17. Y. Han and W.S.W. Ho, "Novel Transformational Membranes and Process for CO_2 Capture from Flue Gas", Carbon Management Project Review Meeting, Pittsburgh, PA, 8/18/2022.
18. S. Li, Y. Han and W.S.W. Ho, T. Pyrzynski, W. Xu, M. Stevens, D. Heim, H. Meyer, A. Sexton and W. Morris, "Engineering Scale Design and Testing of Transformational Membrane Technology for CO_2 Capture", Carbon Management Project Review Meeting, Pittsburgh, PA, 8/16/2022.
19. Y. Han, Y. Yang, R. Pang, and W.S.W. Ho, "Integrated Facilitated Transport Membrane Modules for Highly Selective Syngas Purification and Carbon Capture", NAMS Annual Meeting, Tempe, AZ, 5/16/2022.
20. Y. Han and W.S.W. Ho, "Mitigated Carrier Saturation of Facilitated Transport Membranes for Decarbonizing Dilute CO_2 Sources", NAMS Annual Meeting, Tempe, AZ, 5/16/2022.
21. Y. Han, Y. Yang, R. Pang, and W.S.W. Ho, "Upscaling of Facilitated Transport Membranes for Hydrogen Purification from Coal-Derived Syngas", Paper 579f, AIChE 2021 Annual Meeting, Boston, MA, 11/11/2021.
22. Y. Han and W.S.W. Ho, "Techno-economic Analysis of Facilitated Transport Membranes for H_2 Purification from Coal-Derived Syngas", Paper 514f, AIChE 2021 Annual Meeting, Boston, MA, 11/10/2021.
23. Y. Han and W.S.W. Ho, "Techno-economic Analysis of Facilitated Transport Membranes for H_2 Purification from Coal-Derived Syngas", NAMS Annual Meeting, Estes Park, CO, 9/1/2021.

24. Y. Han, Y. Yang, R. Pang, and W.S.W. Ho, "Upscaling of Facilitated Transport Membranes for Hydrogen Purification from Coal-Derived Syngas", NAMS Annual Meeting, Estes Park, CO, 8/30/2021.
25. Y. Han and W.S.W. Ho, "Novel Transformational Membranes and Process for CO_2 Capture from Flue Gas", Carbon Management and Natural Gas & Oil Research Project Review Meeting, Pittsburgh, PA, 8/17/2021.
26. Y. Han and W.S.W. Ho, "Transformational Membranes for Pre-combustion Carbon Capture", Carbon Management and Natural Gas & Oil Research Project Review Meeting, Pittsburgh, PA, 8/16/2021.
27. S. Li, Y. Han and W.S.W. Ho, T. Pyrzynski, W. Xu and H. Meyer, "Engineering Scale Design and Testing of Transformational Membrane Technology for CO_2 Capture", Carbon Management and Natural Gas & Oil Research Project Review Meeting, Pittsburgh, PA, 8/13/2021.
28. Y. Han, K.K. Chen, W. Salim, D. Wu, and W.S.W. Ho, "Novel Facilitated Transport Membrane and Process for Post-combustion Carbon Capture", Paper 681b, AIChE 2020 Annual Meeting, online, 11/19/2020.
29. Y. Han, X. Deng, L.-C. Lin, and W.S.W. Ho, "New Facilitated Transport Membranes for Hydrogen Purification from Coal-derived Syngas", Paper 538b, AIChE 2020 Annual Meeting, online, 11/19/2020.
30. Y. Han, B. Wang, and W.S.W. Ho, "CO_2 Utilization for CO Production via Fuel Cell Enabled by CO_2-selective Membrane", Paper 423f, AIChE 2020 Annual Meeting, online, 11/19/2020.
31. Y. Han, X. Deng, L.-C. Lin, and W.S.W. Ho, "New Facilitated Transport Membranes for Hydrogen Purification from Coal-derived Syngas", NAMS Annual Meeting, Pittsburg, PA, 5/20/2020.
32. Y. Han, K.K. Chen, W. Salim, D. Wu, and W.S.W. Ho, "Novel Facilitated Transport Membrane and Process for Post-combustion Carbon Capture", NAMS Annual Meeting, Pittsburg, PA, 5/18/2020.
33. Y. Han and W.S.W. Ho, "Facilitated Transport Membranes with Tunable Amine-CO_2 Chemistry for Highly Selective CO_2/H_2 Separation", Paper 750a, AIChE 2019 Annual Meeting, Orlando, FL, 11/15/2019.
34. Y. Han, W. Salim, K.K. Chen, D. Wu, and W.S.W. Ho, "Field Trial of Spiral-wound Facilitated Transport Membrane Module for CO_2 Capture from Flue Gas", Paper 27d, AIChE 2019 Annual Meeting, Orlando, FL, 11/10/2019.
35. Y. Han and W.S.W. Ho, "Novel CO_2-selective Membranes for CO_2 Capture from <1% CO_2 Sources", 2019 NETL Technologies Integrated Review Meeting, Pittsburgh, PA, 8/27/2019.
36. Y. Han and W.S.W. Ho, "Transformational Membranes for Pre-combustion Carbon Capture", 2019 NETL Technologies Integrated Review Meeting, Pittsburgh, PA, 8/27/2019.
37. Y. Han, W. Salim, K.K. Chen, D. Wu, and W.S.W. Ho, "Field Trial of Facilitated Transport Membrane Module for CO_2 Capture from Flue Gas", NAMS Annual Meeting, Pittsburg, PA, 5/13/2019.
38. Y. Han and W.S.W. Ho, "Novel Facilitated Transport Membrane for Post-combustion Carbon Capture: From Membrane Synthesis to Process Design", Paper No. 628d, AIChE 2018 Annual Meeting, Pittsburgh, PA, 11/1/2018.
39. Y. Han and W.S.W. Ho, "Facilitated Transport Membranes for Hydrogen Purification from Coal-derived Syngas", Paper No. 11f, AIChE 2018 Annual Meeting, Pittsburgh, PA, 10/28/2018.
40. Y. Han and W.S.W. Ho, "Novel CO_2-selective Membranes for CO_2 Capture from <1% CO_2 Sources", 2018 NETL CO_2 Capture Technology Project Review Meeting, Pittsburgh, PA, 8/15/2018.
41. Y. Han and W.S.W. Ho, "Synthesis and Techno-economic Analysis of Novel Facilitated Transport Membrane for Post-combustion Carbon Capture", NAMS Annual Meeting, Lexington, KY, 6/11/2018.
42. Y. Han, D. Wu and W.S.W. Ho, "Application of Facilitated Transport Membrane for Carbon Capture from Low CO_2 Concentration Sources", 2018 NAMS Annual Meeting, Lexington, KY, 6/11/2018.
43. Y. Han and W.S.W. Ho, "Techno-economic Analysis of Polymeric Membrane Systems for Post-combustion Carbon Capture", Paper 387d, AIChE Annual Meeting, Minneapolis, MN, 10/31/2017.

44. Y. Han and W.S.W. Ho, "Technical & Economic Feasibility Study of Membranes for Carbon Capture from Low CO_2 Conc. Sources", Paper 57g, AIChE Annual Meeting, Minneapolis, MN, 10/31/2017.

AWARDS

1. Young Membrane Scientist Award, North American Membrane Society (NAMS), Pittsburgh, PA, 2019.
2. Separations Division Graduate Research Award, AIChE, Pittsburgh, PA, 2018.
3. Best Paper of Advanced Materials for Carbon Dioxide Capture for Power Generation Session, AIChE 2018 Annual Meeting, Pittsburgh, PA, 2018.
4. Poster Competition Award, NAMS 2018 Annual Meeting, Lexington, KY, 2018.
5. Elias Klein Founders' Travel Supplement Award, NAMS, Lexington, KY, 2018.
6. Outstanding Poster Presentation, the 7th Graduate Research Symposium (GRS) at Ohio State, Columbus, OH, 2018.
7. Outstanding Oral Presentation, at the 6th GRS at Ohio State, Columbus, OH, 2017.
8. Outstanding Graduate Awards for Academic Achievement, Dept. of Chemical & Biomolecular Eng., Ohio State, Columbus, OH, 2017–2018.
9. National Scholarship for Outstanding Academic Performance, China, 2009–2011.

RESEARCH GRANTS ($38.6MM TOTAL FUNDED; $21.5MM AS LEAD PI)

(Abbreviations: BETO = Bioenergy Technologies Office; DOE = Department of Energy; EERE = Office of Energy Efficiency & Renewable Energy; FECM = Office of Fossil Energy and Carbon Management; IEDO = Industrial Efficiency & Decarbonization Office; NETL = National Energy Technology Laboratory; ODOD = Ohio Department of Development)

1. DE-EE0011209: "Bench-Scale Development of Facilitated Transport Membranes for Olefin/Paraffin Separations"
   - **Yang Han (PI)** and W.S. Winston Ho (co-PI)
   - Sponsored by DOE, IEDO, $3,000,000 (3/1/2014–2/28/2027)
2. DE-FE0032467: "Engineering-Scale Testing of Transformational Membrane Technology for CO_2 Capture from Natural Gas Combined Cycle (NGCC) Flue Gas"
   - **Yang Han (PI)** and W.S. Winston Ho (co-PI)
   - Sponsored by DOE, NETL, $5,000,000 (8/1/2024–7/31/2027)
3. DE-FE0032463: "Engineering-Scale Design and Testing of Transformational Membrane Technology for CO_2 Capture from Cement Gas"
   - **Yang Han (PI)** and W.S. Winston Ho (co-PI)
   - Sponsored by DOE, NETL, $7,000,000 (5/1/2024–4/30/2028)
4. DE-EE0011112: "Bench-Scale Development of Facilitated Transport Membranes for Bio-Syngas Cleanup"
   - **Yang Han (PI)** and W.S. Winston Ho (co-PI)
   - Sponsored by DOE, BETO, $2,499,657 (3/1/2014–2/28/2027)
5. DE-FE0031946: "Engineering Scale Design and Testing of Transformational Membrane Technology for CO_2 Capture"
   - Shiguang Li (Contact PI, GTI Energy), **Yang Han (OSU PI)**, and W.S. Winston Ho (OSU co-PI)
   - Sponsored by DOE, NETL, $16,650,507 ($4,000,000 to OSU) (4/1/2021–7/31/2025)
6. DE-FE0031731: "Novel Transformational Membranes and Process for CO_2 Capture from Flue Gas"
   - W.S. Winston Ho (PI), **Yang Han (co-PI)**, and Li-Chiang Lin (co-PI)
   - Sponsored by DOE, NETL, $2,999,988 (07/01/2019–3/31/2023).

7. DE-FE0031635: "Transformational Membranes for Pre-Combustion Carbon Capture"
   - W.S. Winston Ho (PI) and **Yang Han (co-PI)**
   - Sponsored by DOE, NETL, $799,988 (10/01/2018–02/28/2022)
8. OER-CDO-D-19-12: "Novel Transformational Membranes and Process for CO_2 Capture from Flue Gas"
   - W.S. Winston Ho (PI) and **Yang Han (co-PI)**
   - Sponsored by ODOD, $500,000 (10/1/2019–6/30/2022)
9. OER-CDO-D-19-13: "Transformational Membranes for Pre-Combustion Carbon Capture"
   - W.S. Winston Ho (PI) and **Yang Han (co-PI)**
   - Sponsored by ODOD, $150,000 (10/1/2019–9/30/2021)

PROFESSIONAL AFFILIATIONS

1. American Institute of Chemical Engineers (AIChE)
2. North American Membrane Society (NAMS)
3. American Chemical Society (ACS)

MENTORING

1. Sam Johnstone, undergrad in Chemical Eng., Ohio State 2019–2021
   Undergraduate Honors Research Distinction, now Ph.D. student at UW–Madison
2. Eric McPherson, undergrad in Chemical Eng., Ohio State 2019–2020
   Now Ph.D. student at the City College of New York
3. Jack Allbright, undergrad in Chemical Eng., Ohio State 2019–2020
4. Melissa Ardagh, undergrad in Chemical Eng., Ohio State 2017–2018

PROFESSIONAL SERVICE

American Institute of Chemical Engineers (AIChE)

1. Co-chaired session "Advanced Membranes for Carbon Capture and Sustainability" at AIChE 2023 Annual Meeting, Orlando, FL, 11/7/2023.
2. Judge for the Undergraduate Student Poster Competition, AIChE 2023 Annual Meeting, Orlando, FL, 11/6/2023.
3. Co-chaired session "Membranes for CO_2 Capture II" at AIChE 2022 Annual Meeting, Phoenix, AZ, 11/16/2022.
4. Judge for the Undergraduate Student Poster Competition, AIChE 2022 Annual Meeting, Phoenix, AZ, 11/14/2022.
5. Co-chaired session "Membranes for CO_2 Capture" at AIChE 2021 Annual Meeting, Boston, MA, 11/11/2021.
6. Judge for the Undergraduate Student Poster Competition, AIChE 2021 Annual Meeting, Boston, MA, 11/8/2022.
7. Co-chaired sessions "Membranes for Electrochemical Conversions and Applications I&II" at AIChE 2020 Annual Meeting, online, 11/17/2020.
8. Session assistant for "Fuel Cell Membranes" at AIChE 2018 Annual Meeting, Pittsburgh, PA, 10/28/2018.

Departmental

9. Member of Chemical Hygiene Committee (ChyComm), Department of Chemical and Biomolecular Engineering, The Ohio State University, 2018–2020.

Editorial

10. Review editor on the Editorial Board of Membrane Applications - Gas and Vapor (specialty section of *Frontiers in Membrane Science and Technology*), 2022–now.
11. Topical Advisory Panel Member for journal *Membranes*, 2020–now.

Proposal Review Work

12. Sustainability Research seed grant, The Ohio State University, 2024.
13. President's Research Excellence (PRE) program, The Ohio State University, 2021–2023.

Journal Review Work

14. Reviewer for Nature Communications, Journal of Membrane Science, ACS Applied Materials & Interfaces, Separation and Purification Technology, Industrial & Engineering Chemistry Research, Current Opinion in Chemical Engineering, Cell iScience, Polymers, Membranes, Journal of Natural Gas Science and Engineering, and Advanced Membranes.