

## **Mahdi Malmali**

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### **PROFESSIONAL EXPERIENCE**

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|---------------------|---|
| Jan 2018 – Present  | Assistant Professor<br>Chemical Engineering<br>Texas Tech University, Lubbock, TX   |
| Jan 2015 – Dec 2017 | Research Associate<br>Chemical Engineering and Materials Science<br>University of Minnesota<br><i>(Distributed ammonia manufacturing at lower pressure)</i>         |
| Aug 2014 – Dec 2014 | Postdoctoral Fellow<br>Membrane Science, Engineering, and Technology Center<br>University of Arkansas<br><i>Membrane-based Separations for Wastewater Treatment</i> |

### **EDUCATION**

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|---------------------|---|
| Sep 2011 – Mar 2014 | Ph.D., Chemical Engineering<br>University of Arkansas<br><i>Application of Membrane-based Separations in Biofuel Production</i> |
| Sep 2007 – Jun 2011 | M.Sc., Chemical Engineering<br>Sharif University of Technology<br><i>Dehydration of Tetrahydrofuran Using Zeolites</i>          |
| Sep 2003 – Jun 2007 | B.Sc., Chemical Engineering<br>Razi University  |

### **HONORS & AWARDS**

- 2020 AIChE Futures
- Best Paper Award, AIChE 2017 Annual Meeting, Minneapolis, MN Oct 2017
- University of Minnesota Global Scholar, Sep 2017
- University of Minnesota Postdoctoral Career Development Award, Fall 2016
- Ross E. Martin Chair of Emerging Technologies Scholarship, 2014, Jan 2014
- Elias Klein Founders' award, NAMS meeting 2014, Jun 2014

### **INTERESTS**

Sustainability, Energy Efficiency, Materials Science and Engineering, Energy Storage, Power-to-X, Water, Interfacial Transport

## **PUBLICATIONS**

### In Preparation:

- (1) Srivastava, T., Hsieh, I.-M.; Malmali, M., High permeance composite membranes with Kevlar aramid nanofiber, graphene oxide, and post-treatment for organic solvent nanofiltration, *Chem. Eng. Sci.*
- (2) Mahtab, T., Malmali, M., Ultrastable supported metal halide absorbents prepared via dry impregnation, *Micropor. Mesopor. Mat.*
- (3) Thakur, A. K.; Mahbub, H.; Malmali, M. Laser-Induced Graphene (LIG) Composite Ultrafiltration Membrane with High Antifouling Properties for Water Treatment, *Sep. Purif. Technol.*
- (4) Thakur, A. K.; Mahbub, H.; Malmali, M. Evaluation of fouling and chemical cleaning in sweeping gas membrane distillation treating high salinity produced water, *I&EC Research.*
- (5) Mahbub, H.; Malmali, M. Radiofrequency responsive membranes for desalination purpose, *Adv. Funct. Mater.*
- (6) Lin, B.; Matinpour, H.; Malmali, M. Investigation of flow pattern and mineral particle transport in membrane distillation: implications to fouling and scaling, *Desalination*, **2023**, *Under Review*.

### Under Review:

- (7) Thakur, A. K.; Mahbub, H.; Nowrin, F. H.; Malmali, M. Highly Robust Laser-Induced Graphene (LIG) Ultrafiltration Membrane with Stable Microporous Structure, *Sep. Purif. Technol.* **2023**, *Under Review*.
- (8) Hsieh, I.-M.; Malmali, M., Elucidate scaling behavior in membrane distillation: the effect of biopolymers and antiscalants, *Chem. Eng. J.* , **2023**, *Under Review*.
- (9) Hsieh, I.-M.; Lin, B.; Matinpour, H.; Malmali, M. Unraveling the scaling mechanism in membrane distillation (VMD) and mitigation by hydrodynamics, *Water Research*, **2023**, *Under Review*.
- (10) Nowrin, F.; Malmali, M., Elucidating the role of particle size and intermediate reactions in catalyst deactivation for ammonia synthesis reaction: a study on Co-LiH, *Applied Catalysis A: General*, **2023**, *Under Review*.

### Published:

- (11) Hsieh, I.-M.; Lin, B.; Mahbub, H.; Carter, Z.; Jebur, M.; Cao, Y.; M.; Brownlow, J.; Wickramasinghe, S. R.; Malmali, M. Field demonstration of intensified membrane distillation for treating oilfield produced waters from unconventional wells, *Desalination*, **2023**, 116771. <https://doi.org/10.1016/j.desal.2023.116771>
- (12) Lin, B.; Matinpour, H.; Malmali, M. Evaluation of spacer-induced hydrodynamic mixing using particle image velocimetry: Impact on membrane distillation performance, *Desalination*, **2023**, 116758. <https://doi.org/10.1016/j.desal.2023.116758>
- (13) Thakur, A. K.; Sengodo, P.; Jadhav, A.; Malmali, M., Manganese Carbonate/Laser-Induced Graphene Composite for Glucose Sensing, *ACS Omega*, **2023**, *accepted*. <https://doi/full/10.1021/acssuschemeng.2c0671>
- (14) Lin, B.; Nowrin, F.; Rosenthal, J.; Malmali, M. Perspective on Intensification of Haber– Bosch to Enable Ammonia Production under Milder Conditions, *ACS Sustainable Chem. Eng.* **2023**, *Accepted – Highlighted on Journal's cover page*.
- (15) Jebur, M.; Cao, Y.; Malmali, M.; Qian, X.; Wickramasinghe, S. R., Treating hydraulic fracturing produced water by electrocoagulation. *Sep. Sci. Technol.* **2023**, 58 (6), 111-1120. <https://doi.org/10.1080/01496395.2023.2179492>
- (16) Islam, M. R.; Lin, B.; Yue, Y.; Chen, C.-C.; Malmali, M. Comparative energetics of various membrane distillation configurations and guidelines for design and operation, *Membranes*. **2023**, 13 (3) 273. <https://doi.org/10.3390/membranes13030273>.
- (17) Hsieh, I. M.; Malmali, M. Combined Chlorine Dioxide – Membrane Distillation for the Treatment of Produced Water. *Desalination*, **2023**, 551, 116396. <https://doi.org/10.1016/j.desal.2023.116396>.

- (18) Mahbub, H.; Saed, M.; Malmali, M. Pattern-Dependent Radio-Frequency Heating of Laser-Induced Graphene Flexible Heaters. *ACS Appl. Mater. Interfaces*, **2023**, 15 (14), 18074-18086. <https://doi.org/10.1021/acsmi.3c00569>
- (19) Cao, Y.; Malmali, M.; Qian, X.; Wickramasinghe, S.R., Continuous electrocoagulation -membrane distillation unit for treating hydraulic fracturing produced water, *J. Water Process. Eng.* **2022**, 50, 103219. <https://doi.org/10.1016/j.jwpe.2022.103219>
- (20) Thakur, A. K.; Mahbub, H.; Nowrin, F. H.; Malmali, M. Highly Robust Laser-Induced Graphene (LIG) Ultrafiltration Membrane with Stable Microporous Structure, *ACS Appl. Mater. Interfaces* **2022**, 14, 41, 46884–46895. <https://doi.org/10.1021/acsmi.2c09563>
- (21) Lin, B.; Malmali, M. Energy and Exergy Analysis of Multi-Stage Vacuum Membrane Distillation Integrated with Mechanical Vapor Compression. *Sep. Purif. Tech.*, **2022**, 306, 122568. <https://doi.org/10.1016/j.seppur.2022.122568>
- (22) Nowrin, F. H.; Malmali, M. Optimizing Reaction-Absorption Process for Lower Pressure Ammonia Production. *ACS Sustainable Chem. Eng.* **2022**, 10, 37, 12319–12328. <https://doi.org/10.1021/acssuschemeng.2c03554>
- (23) Rosenthal, J.; Hsieh, I. M.; Malmali, M. ZSM-5/Thermoplastic Polyurethane Mixed Matrix Membranes for Pervaporation of Binary and Ternary Mixtures of n-Butanol, Ethanol, and Water. *Ind. Eng. Chem. Res.* **2022**, 61, 34, 12764–12775. <https://doi.org/10.1021/acs.iecr.2c01794>
- (24) Thakur, A. K.; Malmali, M. Advances in Polymeric Cation Exchange Membranes for Electrodialysis: An Overview. *J. Environ. Chem. Eng.* **2022**, 10 (5), 108295. <https://doi.org/https://doi.org/10.1016/j.jece.2022.108295>
- (25) Alborzi, A.; Hsieh, I.-M.; Reible, D.; Malmali, M. Analysis of Fouling Mechanism in Ultrafiltration of Produced Water. *J. Water Process Eng.* **2022**, 49, 102978. <https://doi.org/https://doi.org/10.1016/j.jwpe.2022.102978>
- (26) de Rezende, A.; Malmali, M.; Dral, P. O.; Lischka, H.; Tunega, D.; Aquino, A. J. A. Machine Learning for Designing Mixed Metal Halides for Efficient Ammonia Separation and Storage. *J. Phys. Chem. C* **2022**, 126 (29), 12184–12196. <https://doi.org/10.1021/acs.jpcc.2c02586>
- (27) Thakur, A. K.; Lin, B.; Nowrin, F. H.; Malmali, M. Comparing Structure and Sorption Characteristics of Laser-Induced Graphene (LIG) from Various Polymeric Substrates. *ACS Environ. Sci. Technol. Water* **2022**, 2 (1), 75–87. <https://doi.org/10.1021/acsestwater.1c00259>
- (28) Hrtus, D. J.; Nowrin, F. H.; Lomas, A.; Fotsa, Y.; Malmali, M. Achieving +95% Ammonia Purity by Optimizing the Absorption and Desorption Conditions of Supported Metal Halides. *ACS Sustain. Chem. Eng.* **2021**. <https://doi.org/10.1021/acssuschemeng.1c05668>.
- (29) Islam, M. R.; Hsieh, I.-M.; Lin, B.; Thakur, A. K.; Chen, C.-C.; Malmali, M. Molecular Thermodynamics for Scaling Prediction: Case of Membrane Distillation. *Sep. Purif. Technol.* **2021**, 276, 119231. <https://doi.org/https://doi.org/10.1016/j.seppur.2021.119231>
- (30) Jebur, M.; Chiao, Y. H.; Thomas, K.; Patra, T.; Cao, Y.; Lee, K.; Gleason, N.; Qian, X.; Hu, Y.; Malmali, M.; Wickramasinghe, S. R. Combined Electrocoagulation-Microfiltration-Membrane Distillation for Treatment of Hydraulic Fracturing Produced Water. *Desalination* **2021**, 500 (May 2020), 114886. <https://doi.org/10.1016/j.desal.2020.114886>
- (31) Lin, B.; Hsieh, I.-M.; Malmali, M. Rapid Pressure Swing Adsorption for Small Scale Ammonia Separation: A Proof-of-Concept. *J. Adv. Manuf. Process.* **2021**, n/a (n/a), e10077. <https://doi.org/https://doi.org/10.1002/amp2.10077>.
- (32) Thakur, A. K.; Hsieh, I. M.; Islam, M. R.; Lin, B.; Chen, C. C.; Malmali, M. Performance of Sweeping Gas Membrane Distillation for Treating Produced Water: Modeling and Experiments. *Desalination* **2020**, 492 (April), 114597. <https://doi.org/10.1016/j.desal.2020.114597>.
- (33) Lin, B.; Wiesner, T.; Malmali, M. Performance of a Small-Scale Haber Process: A Techno-Economic Analysis. *ACS Sustain. Chem. Eng.* **2020**, 8 (41), 15517–15531. <https://doi.org/10.1021/acssuschemeng.0c04313>.

- (34) Ojha, D. K.; Kale, M. J.; McCormick, A. V.; Reese, M.; Malmali, M.; Dauenhauer, P.; Cussler, E. L. Integrated Ammonia Synthesis and Separation. *ACS Sustain. Chem. Eng.* **2019**, 7 (23), 18785–18792. <https://doi.org/10.1021/acssuschemeng.9b03050>.

Before joining TTU:

- (35) Smith, C.; Malmali, M.; Liu, C.; McCormick, A. V. Rates of Ammonia Absorption and Release in Calcium Chloride, *ACS Sustainable Chem. Eng.* **2018**, 6, 9, 11827–11835. <https://doi.org/10.1021/acssuschemeng.8b02108>
- (36) Malmali, M.; Askegaard, J.; Sardari, K.; Eswaranandam, S.; Sengupta, A.; Wickramasinghe, S. R. Evaluation of Ultrafiltration Membranes for Treating Poultry Processing Wastewater. *J. Water Process Eng.* **2018**, 22 (November 2017), 218–226. <https://doi.org/10.1016/j.jwpe.2018.02.010>.
- (37) Malmali, M.; Le, G.; Hendrickson, J.; Prince, J.; McCormick, A. V.; Cussler, E. L. Better Absorbents for Ammonia Separation. *ACS Sustain. Chem. Eng.* **2018**, 6 (5), 6536–6546. <https://doi.org/10.1021/acssuschemeng.7b04684>.
- (38) Malmali, M.; Reese, M.; McCormick, A. V.; Cussler, E. L. Converting Wind Energy to Ammonia at Lower Pressure. *ACS Sustain. Chem. Eng.* **2018**, 6 (1). <https://doi.org/10.1021/acssuschemeng.7b03159>.
- (39) Cussler, E.; McCormick, A.; Reese, M.; Malmali, M. Ammonia Synthesis at Low Pressure. *J. Vis. Exp.* **2017**, No. 126, 55691. <https://doi.org/10.3791/55691>.
- (40) Wagner, K.; Malmali, M.; Smith, C.; McCormick, A.; Cussler, E. L.; Zhu, M.; Seaton, N. C. A. Column Absorption for Reproducible Cyclic Separation in Small Scale Ammonia Synthesis. *AIChE J.* **2017**, 63 (7), 3058–3068. <https://doi.org/10.1002/aic.15685>.
- (41) Malmali, M.; Fyfe, P.; Lincicome, D.; Sardari, K.; Wickramasinghe, S. R. Selecting Membranes for Treating Hydraulic Fracturing Produced Waters by Membrane Distillation. *Sep. Sci. Technol.* **2017**, 52 (2), 266–275. <https://doi.org/10.1080/01496395.2016.1244550>
- (42) Malmali, M.; Wei, Y.; McCormick, A.; Cussler, E. L. Ammonia Synthesis at Reduced Pressure via Reactive Separation. *Ind. Eng. Chem. Res.* **2016**, 55 (33), 8922–8932. <https://doi.org/10.1021/acs.iecr.6b01880>
- (43) Malmali, M.; Wagner, K.; Reese, M.; Cussler, E. L.; McCormick, A. V. Undergraduate Design Project Ideas in Sustainability: Rethinking Ammonia Synthesis. In *ASCE's 123rd Annual Conference and Exposition*; New Orleans, LA, 2016.
- (44) Malmali, M.; Wickramasinghe, S. R.; Tang, J.; Cong, H. Sugar Fractionation Using Surface-Modified Nanofiltration Membranes. *Sep. Purif. Technol.* **2016**, 166, 187–195. <https://doi.org/10.1016/j.seppur.2016.04.025>
- (45) Reese, M.; Marquart, C.; Malmali, M.; Wagner, K.; Buchanan, E.; McCormick, A.; Cussler, E. L. Performance of a Small-Scale Haber Process. *Ind. Eng. Chem. Res.* **2016**, 55 (13), 3742–3750. <https://doi.org/10.1021/acs.iecr.5b04909>
- (46) Qian, X.; Malmali, M.; Wickramasinghe, S. R. 9 - Membranes for the Removal of Fermentation Inhibitors from Biofuel Production; Figoli, A., Cassano, A., Basile, A. B. T.-M. T. for B., Eds.; Woodhead Publishing, 2016; pp 219–240. <https://doi.org/https://doi.org/10.1016/B978-0-08-100451-7.00009-8>
- (47) Malmali, M.; Wickramasinghe, S. R. Continuous Hydrolysis of Lignocellulosic Biomass via Integrated Membrane Processes. *Integrated Membrane Systems and Processes*. January 4, 2016, pp 61–78. <https://doi.org/https://doi.org/10.1002/9781118739167.ch4>
- (48) Malmali, M.; Stickel, J.; Wickramasinghe, S. R. Investigation of a Submerged Membrane Reactor for Continuous Biomass Hydrolysis. *Food Bioprod. Process.* **2015**, 96, 189–197. <https://doi.org/10.1016/j.fbp.2015.07.001>
- (49) Malmali, M.; Stickel, J. J.; Wickramasinghe, S. R. Sugar Concentration and Detoxification of Clarified Biomass Hydrolysate by Nanofiltration. *Sep. Purif. Technol.* **2014**, 132, 655–665. <https://doi.org/10.1016/j.seppur.2014.06.014>

## **PATENTS**

- (1) Malmali, M.; Nowrin, F.H.; Dowdler, E., Methods for Making Ammonia Absorbent – To be filed on Aug 2023.
- (2) Malmali, M., Enhanced Seasonal Ammonia-Based Thermochemical Energy Storage – To be filed on Aug 2023.
- (3) Malmali, M.; Thakur, A. K. Macroporous Graphene Membrane - Filed on Feb 2022, 63/310,458, 2022.
- (4) Malmali, M.; Mahtab, T. Supported Absorbents for Ammonia Separation - Filed on Aug 2022, 63/354,955, 2022.
- (5) Cussler, E. L.; McCormick, A. V.; Reese, M.; Ojha, D.; Kale, M.; Dauenhauer, P.; Daoutidis, P., Malmali, M. Integrated apparatus for producing ammonia. US20200325030A1, 2020.
- (6) Cussler, E. L.; McCormick, A. V.; Malmali, M. Stable Ammonia Absorbents. US20200339434A1, 2023.
- (7) Malmali, M.; McCormick, A. V.; Cussler, E. L. Process for Making Ammonia. US10287173B2, 2019.

## **PRESENTATIONS**

### **Invited**

- (1) “Decarbonizing Water and Energy”, Rensselaer Polytechnic Institute, Chemical and Biological Engineering, Troy, NY, April **2023**.
- (2) “Decarbonizing Ammonia”, 2023 Industrial Processes Emissions Reduction (IPER), Southwest Research Institute, San Antonio, Tx, March **2023**.
- (3) “Sustainable ammonia synthesis under milder condition”, Department of Chemical and Biological Engineering, Colorado School of Mines, Golden, CO, October **2022**.
- (4) “Ammonia for Thermochemical Energy Storage”, Department of Chemical and Biomolecular Engineering, Clarkson University, Potsdam, NY, Oct **2022**.
- (5) “Ammonia E-Fuel”, Electric Power Research Institute – Low Carbon Resources Initiative, Palo Alto, May **2022**.
- (6) “Ammonia-based Thermochemical Energy Storage”, Voiland School of Chemical Engineering and Bioengineering, Washington State University, Pullman, WA, March **2022**.
- (7) “Membrane Distillation for Desalination of Hypersaline Brine”, Otto H. York Department of Chemical and Materials Engineering New Jersey Institute of Technology, Newark, NJ, February **2022**.
- (8) “Decarbonizing Ammonia”, Electric Power Research Institute – Low Carbon Resources Initiative, Palo Alto, Feb **2022**.
- (9) “Intensifying Membrane Distillation for Treating Produced Water”, Ralph E. Martin Department of Chemical Engineering, University of Arkansas, April **2021**.
- (10) "Ammonia Production at Milder Conditions for Distributed Manufacturing", AIChE Futures, American Institute of Chemical Engineers **2020** Annual Meeting, San Francisco, November 2020.
- (11) “Treating high-salinity brine wastewater streams: recycle and reuse”, Industrial Water Use and Reuse Workshop, San Francisco, November **2020**.
- (12) “Treating produced water for recycle and reuse”, Water Environment Association of Texas (WEAT) Eckenfelder Lecture Series, Austin, TX, July **2019**.
- (13) “Replacing Phase Changing Separations: Revising Ammonia Manufacturing,” American Institute of Chemical Engineers 2018 Annual Meeting, Pittsburgh, PA, October **2018**.

### **Conference Presentations**

- (1) Malmali, M.; Hasib, M., Surface-Heated Membranes with Radiofrequency for Membrane Distillation Applications, 13<sup>th</sup> International Congress on Membranes and Membrane Processes, Chiba, Japan, Jul **2023**.

- (2) Malmali, M.; Lin, B., Elucidating the scaling behavior in membrane distillation: effects of spacer geometry and antiscalants, 13<sup>th</sup> International Congress on Membranes and Membrane Processes, Chiba, Japan, Jul **2023**.
- (3) Malmali, M.; Hsieh, I.-M.; Lin., B.; Mahbub, H., Field demonstration of intensified membrane distillation for treating hypersaline hydraulic fracturing produced water, 13<sup>th</sup> International Congress on Membranes and Membrane Processes, Chiba, Japan, Jul **2023**.
- (4) Nowrin, F.; Malmali, M. "Unraveling the deactivation mechanism of Co-LiH composite catalyst for ammonia synthesis at milder conditions", American Chemical Society Fall Meeting, San Francisco, CA, August **2023**.
- (5) Hasib, M.; Malmali, M. Radiofrequency responsive membranes for membrane distillation applications, North American Membrane Society Annual Conference, Tuscaloosa, AL, May **2023**.
- (6) Malmali, M.; Lin, B., Energy and exergy analysis of multi-stage vacuum membrane distillation integrated with mechanical vapor compression, North American Membrane Society Annual Conference, Tuscaloosa, AL, May **2023**.
- (7) Malmali, M.; Hsieh, I.-M., In-situ measurements to differentiate homogeneous and heterogeneous nucleation in membrane distillation: effects of spacer geometry and antiscalants, North American Membrane Society Annual Conference, Tuscaloosa, AL, May **2023**.
- (8) Malmali, M.; Hsieh, I.-M.; Lin., B.; Mahbub, H., Intensified membrane distillation for treating oilfield produced waters from unconventional wells: Energetics analysis and pilot demonstration, North American Membrane Society Annual Conference, Tuscaloosa, AL, May **2023**.
- (9) Nowrin, F.; Malmali, M., Experimental Optimization of Process Parameters for Ammonia Production, American Institute of Chemical Engineers 2022 Annual Meeting, Phoenix, AZ, November **2022**.
- (10) McCormick, A.; Marquart, C.; Onuoha, C.; Palys, M.; Pursell, Z.; Cussler, E.; Daoutidis, P.; Dauenhauer, P.; Reese, M.; Parvathikar, S.; Malmali, M. Optimizing Absorption to Improve Haber-Bosch Synthesis, American Institute of Chemical Engineers 2022 Annual Meeting, Phoenix, AZ, November **2022**.
- (11) Cao, Y.; Jeboor, M.; Malmali, M.; Qian, X.; Wickramasinghe, R., Treating Hydraulic Fracturing Produced Water By Electrocoagulation, American Institute of Chemical Engineers 2022 Annual Meeting, Phoenix, AZ, November **2022**.
- (12) Malmali, M.; Nowrin, F., Thermochemical Energy Storage and Ammonia Manufacturing Using Absorption-enhanced Haber-Bosch Process: Proof-of-concept Experiments, SolarPACES 2022, Albuquerque, NM, September, **2022**.
- (13) Nowrin, F.; Mahtab, T.; Malmali, M., Robust supported metal halide absorbents for ammonia separation and storage, American Chemical Society Fall Meeting, Chicago, IL, August **2022**.
- (14) Srivastava, T.; Hsieh, I.-M.; Malmali, M., Using Kevlar aramid nanofiber membranes modified with graphene oxide and post-treated with calcium chloride for high-flux organic solvent nanofiltration, North American Membrane Society Annual Conference, Tempe, AZ, June **2022**.
- (15) Hsieh, I.-M.; Lin, B.; Matinpour, H.; Malmali, M., Flow dynamics in a spacer-filled membrane distillation channel, North American Membrane Society Annual Conference, Tempe, AZ, June **2022**.
- (16) Lin, B.; Matinpour, H.; Malmali, M., Combined in-situ imaging and CFD to unravel the scaling mechanism in membrane distillation of high salinity brine, North American Membrane Society Annual Conference, Tempe, AZ, June **2022**.
- (17) Mahbub, H.; Malmali, M., Designing super-hydrophobic laser-induced graphene membranes for membrane distillation, North American Membrane Society Annual Conference, Tempe, AZ, June **2022**.
- (18) Thakur, A. K.; Malmali, M., Fabricating Stable and Robust Electrically Conductive Laser-Induced Graphene (LIG) Membranes for High-Flux Ultrafiltration, North American Membrane Society Annual Conference, Tempe, AZ, June **2022**.



- (19) Islam, M. R.; Hsieh, I.-M.; Lin, B.; Thakur, A. K.; Chen, C.-C.; Malmali, M., Molecular Thermodynamics for Scaling Prediction in Filtration of Hypersaline Brine: Case of Membrane Distillation, American Geophysical Union Fall Meeting, San Francisco, CA, December 2020.
- (20) Islam, M. R.; Chen, C.-C.; Malmali, M., Molecular Thermodynamics for Scaling Prediction in Membrane Distillation, American Institute of Chemical Engineers 2020 Annual Meeting, San Francisco, CA, November 2020.
- (21) Jebur, M.; Cao, Y.; Malmali, M.; Wickramasinghe, R., Evaluation of Integrated Electrocoagulation-Microfiltration and Direct Contact Membrane Distillation Processes for Produced Water Treatment, American Institute of Chemical Engineers 2020 Annual Meeting, San Francisco, CA, November 2020.
- (22) Lin, B.; Malmali, M., Performance of Multi-Stage Vacuum Membrane Distillation Integrated with Mechanical Vapor Compression, American Institute of Chemical Engineers 2020 Annual Meeting, San Francisco, CA, November 2020.
- (23) Malmali, M.; Hsieh, I.-M.; Islam, M.; Lin, B.; Thakur, A., Performance of Sweeping Gas Membrane Distillation for Treating Produced Water: Modeling and Experiments, American Institute of Chemical Engineers 2020 Annual Meeting, San Francisco, CA, November 2020.
- (24) Lin, B.; Wiesner, T.; Malmali, M., Techno-Economic Analysis of Small Haber-Bosch Process, Ammonia Energy Association Conference, San Francisco, CA, November 2020.
- (25) Malmali, M., Modular Mechanical Vapor Compression Membrane Distillation (MVC-MD) for Treatment of High TDS Produced Water, American Institute of Chemical Engineers 2020 Annual Meeting, San Francisco, CA, November 2020.
- (26) Malmali, M., Modular Mechanical Vapor Compression Membrane Distillation (MVC- MD) for Treatment of High TDS Produced Pater, AIChE Spring Annual Meeting, New Orleans, LA, April 2019.
- (27) Malmali, M., Chen, C.-C.; Wickramasinghe, R.; Hussain, F., Treating High Salinity Wastewater with Intensified Mechanical Vapor Compression-Membrane Distillation, AIChE Annual Meeting, Pittsburgh, PA, October 2018 (*poster*).
- (28) Malmali, M., Modular Mechanical Vapor Compression-Membrane Distillation (MVC- MD) for Treatment of High TDS Produced Water, AIChE Annual Meeting, Pittsburgh, PA, October 2018.
- (29) Hsieh, I.-M.; Malmali, M., Fabricating Polyurethane/Zeolite Mixed Matrix Membranes for Pervaporation of Dilute Aqueous Organic Solvents, International, published in proceedings. AIChE Annual Meeting, Pittsburgh, PA, October 2018.
- (30) Malmali, M.; Prince, J.; Reese, M.; McCormick, A.; Cussler, E., Lower Pressure Ammonia Synthesis, the NH<sub>3</sub> Energy+: Enabling Optimized, Sustainable Energy and Agriculture/2017 AIChE Annual Meeting, Minneapolis, MN, November 2017.
- (31) Malmali, M.; Reese, M.; McCormick, A.; Cussler, E., Distributed Ammonia Manufacturing, the 2017 Annual AIChE Meeting, Minneapolis, MN, November 2017.
- (32) Malmali, M.; Smith, C.; McCormick, A.; Cussler, E., Regeneration of Ammonia-Loaded Metal Halide Absorbents, the 2017 Annual AIChE Meeting, Minneapolis, MN, November 2017.
- (33) Malmali, M.; Prince, J.; McCormick, A.; Cussler, E., Lower Pressure Ammonia Synthesis, the 254th ACS National Meeting, Washington DC, August 2017.
- (34) Malmali, M.; McCormick, A.; Cussler, E., Viability of Low Pressure Ammonia Synthesis via Reactive Separation, the 2016 Annual AIChE Meeting, San Francisco, CA, November 2016.
- (35) Malmali, M.; Reese, M.; Marquart, C.; Buchanan, E.; Wagner, K.; McCormick, A.; Cussler, E., Small-Scale Distributed Ammonia Produced: Analysis of Pilot Plant Runs and Routes to Improve the Economics of Scale, 2016 Annual AIChE Meeting, San Francisco, CA, November 2016.
- (36) Malmali, M.; Reese, M.; McCormick, A.; Cussler, E., Small-Scale Low Pressure Ammonia Synthesis, 2016 NH<sub>3</sub> Fuel Conference, Los Angeles, CA, September 2016.
- (37) Malmali, M.; Wagner, K.; Reese, M.; Cussler, E.; McCormick, A., "Understanding Design Project Ideas in sustainability: Rethinking Ammonia Synthesis, 123<sup>rd</sup> American Society of Engineering Education Conference, New Orleans, LA, June 2016.

- (38) Malmali, M.; Wagner, K; Cussler, E., Novel Reaction-Separation Process for Sustainable Small-scale Ammonia Manufacturing, IPrime 2016 Annual Meeting, Minneapolis, MN, June 2016.
- (39) Wickramasinghe, R.; Malmali, M., Effect of Membrane Structure on Membranes Performance during Membrane Distillation, 2015 International Chemical Congress of Pacific Basin Societies, December Honolulu, HI, December 2015.
- (40) Wickramasinghe, R.; Malmali, M., Continuous Enzymatic Hydrolysis of Biomass in a Membrane Reactor, 2015 International Chemical Congress of Pacific Basin Societies, December, Honolulu, HI, December 2015.
- (41) Malmali, M.; Wagner, K.; McCormick, A.; Cussler, E., Enhanced Ammonia Production with Combined Reaction-Separation: Kinetics of Reaction and Adsorption, 2015 Annual AIChE Meeting, Salt Lake City, UT, November 2015.
- (42) Malmali, M.; Wickramasinghe, R., Effect of Membrane Structure on Membranes Performance during Membrane Distillation, 2015 Annual AIChE Meeting, Salt Lake City, UT, November 2015.
- (43) Wickramasinghe, R.; Malmali, M., Treating Poultry Processing Wastewaters by Ultrafiltration, The 8<sup>th</sup> Sino-US Joint Conference of Chemical Engineering, Shanghai, China, October 2015.
- (44) Wickramasinghe, R.; Malmali, M., Sardari, K., Effect of Membrane Structure on Membrane Performance during Membrane Distillation, The 8<sup>th</sup> Sino-US Joint Conference of Chemical Engineering, Shanghai, China, October 2015.
- (45) Wickramasinghe, R.; Stickel, J.; Qian, X.; Malmali, M., Continuous Enzymatic Hydrolysis of Biomass in a Membrane Reactor, 37<sup>th</sup> Symposium on Biotechnology for Fuels and Chemicals, San Diego, CA, April 2015.
- (46) Malmali, M.; Wickramasinghe, R., Membrane-based Separation Processes for TDS in Oil&Gas Produced Water, Membrane Science, Engineering and Technology Meeting, boulder, CO/ Fayetteville, AR/ Newark, NJ, US, October 2013, April 2014, October 2014, April 2015.
- (47) Malmali, M.; Stickel, J.; Wickramasinghe, R., Modified Ultrafiltration Membranes for Fractionation of Sugars, 2014 Annual AIChE Meeting, Atlanta, GA, November 2014.
- (48) Malmali, M.; Stickel, J.; Wickramasinghe, R., Continuous Enzymatic Hydrolysis of Biomass in a Membrane Reactor, 2014 North American Membrane Society Meeting, Houston, TX, June 2014.
- (49) Malmali, M.; Stickel, J.; Wickramasinghe, R., Continuous Enzymatic Hydrolysis of Biomass in a Membrane-Assisted Reactor, 2013 Annual AIChE Meeting, San Francisco, CA, November 2013.
- (50) Malmali, M.; Stickel, J.; Wickramasinghe, R., Sugar Concentration for Continuous Enzymatic Saccharification Using Nanofiltration and Reverse Osmosis Membranes, 2012 Annual AIChE Meeting, Pittsburgh, PA, November 2012.

### **TEACHING EXPERIENCE**

- CHE 4455 Chemical Process Design and Simulation – Spring 2018 [enrollment: 84]
- CHE 4335/5335 Intermediate Transport Phenomena – Fall 2018 [enrollment: 8]
- CHE 4455 Chemical Process Design and Simulation – Spring 2019 [enrollment: 85]
- CHE 4335/5335 Intermediate Transport Phenomena – Fall 2019 [enrollment: 13]
- CHE 4455 Chemical Process Design and Simulation – Spring 2020 [enrollment: 103]
- CHE 4335/5335 Intermediate Transport Phenomena – Fall 2020 [enrollment: 33]
- CHE 4455 Chemical Process Design and Simulation – Spring 2020 [enrollment: 87]
- CHE 4455 Sustainable Chemical Engineering Concept and Design – Fall 2020 [enrollment: 32]
- CHE 4455 Chemical Process Design and Simulation – Spring 2021 [enrollment: 49]
- CHE 4455 Sustainable Chemical Engineering Concept and Design – Fall 2021 [enrollment: 13]
- CHE 4455 Chemical Process Design and Simulation – Spring 2022 [enrollment: 54]
- CHE 4455 Sustainable Chemical Engineering Concept and Design – Fall 2022 [enrollment: 18]
- CHE 4455 Chemical Process Design and Simulation – Spring 2023 [enrollment: 33]



## **PROFESSIONAL MEMBERSHIP**

- American Institute of Chemical Engineers (AIChE) – (2012 – Present) North American Membrane Society (NAMS) – (2014 – Present) American Chemical Society (ACS) – (2014 – Present)
- American Society for Engineering Education (ASEE) – (2016 – Present) Water Environment Association of Texas (WEAT) – (2018 – Present)

## **CONFERENCE/PROGRAM ORGANIZATION**

- **Meeting organizing chair - 33<sup>rd</sup> North America Membrane Society Annual Meeting (NAMS 2024) in Santa Fe, NM.**
- AIChE 2019 Ammonia Energy Topical Conference, co-Organizer, October 2019  
9th Annual Eckenfelder Lecture Series, organizer, July 2019
- **AIChE Membrane Separations 2-D Division Co-Chair – since 2017**
- ICOM2017 “Young Membranologists Workshop” organizer and session chair
- AIChE 2016 - 2023 “Membranes for Water Treatment, Reuse, and Desalination I and III” session Co-chair

## **RESEARCHERS SUPERVISED**

### **Postdoctoral Researchers**

1. **Amit Kumar Thakur** **2018-2022**  
Integrated mechanical vapor compression-membrane distillation (MD-MVC) for treating produced water & laser induced graphene membranes for desalination
2. **Md Rashedul Islam** (co-supervised with Chau-Chyun Chen) **2018-2021**  
Modeling and simulation of integrated mechanical vapor compression-membrane distillation (MD-MVC) for treating produced water

### **Ph.D. Students**

1. **I-Min Hsieh** **2018 – 2022**  
Unraveling the mechanism of scaling in membrane distillation
2. **Bosong Lin** **2020 – 2022**  
Energy analysis of chemical processes, simulation & modeling
3. **Fouzia Nowrin** **2019 – present**  
Low temperature single vessel ammonia synthesis
4. **Hasib Mahboob** **2020 – present**  
Designing advanced surface heated membranes to improving the heating efficiency in membrane distillation
5. **Tanveer Mahtab** **2021 – present**  
Integrated methanol synthesis at moderate conditions
6. **Ashkan Alborzi** (co-advised by Prof. Danny Reible) **2019-2020**  
Mechanism of fouling in ultrafiltration of produced water
7. **Shahriar Rahman** **2022-Present**  
Ammonia-based thermochemical energy storage
8. **Sufian Bin Humayon** **2022-Present**  
Conductive ammonia absorbents
9. **Amir Safikhani** **2023-Present**  
Modeling and simulation of reaction-absorption for low pressure ammonia synthesis

## M.S. Students

- 1. Kenji Flores** **2018-2019**  
Composite Catalysts for Low Temperature Ammonia Synthesis
- 2. Justin Rosenthal** (currently graduate student at UT-Austin) **2018 – 2021**  
Pervaporation membranes for dilute organic separation
- 3. Yanick Fotsa** **2018 – 2020**  
Low Pressure Ammonia Synthesis
- 4. Daniel Hrtus** **2019-2020**  
Ammonia release from supported metal halides
- 5. Tanya Srivastava** **2020 – 2022**  
Kevlar-based organic solvent nanofiltration membranes
- 6. Emily Dowding** **2021 – Present**  
Metal halide binder composites for facile ammonia uptake and release

## Undergraduate Students

- 1. Austin Lomas (2019-2022)** – Mixed Metal Halides for Enhanced Ammonia Absorption
- 2. John Lance (2018-2019)** – Electrospun Janus Membranes for Membrane Distillation
- 3. Virgilio Garcia (Summer 2019)** – Fit-for-purpose Produced Water Treatment
- 4. Christopher Adebunmi (Summer 2019)** – Optimizing Ammonia Absorption
- 5. Rohit Paradkar (2018-2019)** – Ammonia Absorption-Desorption in Calcium Chloride
- 6. Thong Le (Summer 2018)** – Simulating Air Gap Membrane Distillation (2018-2019); currently PhD student at Texas Tech University
- 7. Mohammed Al-Adimy (Summer and Fall 2018)** – Better Absorbents for Ammonia Capture
- 8. Fernando Fernandez (Summer and Fall 2018)** – Ammonia Desorption from Metal Halide Salts
- 9. Andy Vu (Summer and Fall 2018)** – Impregnation of Metal Halides into Porous Supports
- 10. Gabriel Villafranca (Summer 2019)** – Fabricating Polyurethane Pervaporation Membranes
- 11. Mobisola Oyewole (Fall 2019)** – Designing Mixed Matrix Pervaporation Membranes
- 12. Justin Rosenthal (2018-2020)** – Pervaporation for separation of solvents
- 13. Aditya Dimri (Summer 2019)** – Fit-for-purpose Produced Water Treatment
- 14. Emily Dowding (Fall 2021-present)** – Designing support free metal halide absorbents
- 15. Adelina Carr (Fall 2021-Spring 2022)** – Designing support free metal halide absorbents
- 16. Brian Elliot (Fall 2021-Spring 2022)** – Membrane distillation crystallization of geothermal brine
- 17. Shaina Field-Farias (Summer 2022-Spring 2023)** – Selective lithium recovery
- 18. Kyle Markle (Fall 2022-present)** – Fibrous lithium recovery sorbents
- 19. Paige Skeets (Fall 2022-Spring 2023)** – Methanol synthesis
- 20. Andrew Skowlund (Fall 2022- Spring 2023)** – Conductive sorbents

### *At the University of Minnesota*

- 21. Collin Smith** – Oscillating Pistons for Ammonia Separation and Concentration
- 22. Giang Le** – Better absorbents for ammonia synthesis
- 23. Jeniffer Hendrickson** – Better absorbents for ammonia synthesis
- 24. Joshua Prince** – Better absorbents for ammonia synthesis
- 25. Michael Ho** – Acid trap for ammonia quantification
- 26. Garret Johnson** – Modeling and simulation of ammonia manufacturing
- 27. Mathew Folkert** – Reaction-absorption for ammonia synthesis
- 28. Karl Wuolo-Journey** – Optimizing ammonia release from absorbents
- 29. Mathew Moskal** – Ammonia detection with infrared microscopy

### *At the University of Arkansas*

- 30. James Cummings** – Continuous hydrolysis of biomass in a membrane reactor

## High School Students

1. Hayden Barnes (Upward Bound Program)

## THESIS COMMITTEE (Texas Tech University)

- 1- **Md Muniruddin**, Ph.D. 2019, “Nanoassembly of Photoactive Materials towards Designing Visible Light Heterostructured Photocatalysts”, (Nurxat Nuraje – Chemical Engineering)
- 2- **Hla Tun**, Ph.D. 2020, “Application of the Adsorption NRTL (aNRTL) Activity Coefficient Model to Estimate the Isosteric Heat of Adsorption of Pure and Mixed-Gas Adsorption”, (Prof. Chau-Chyun Chen – Chemical Engineering)
- 1- **Tony Kirkes**, Ph.D. 2020 ”Comprehensive Thermodynamic Modeling of Complex Aqueous Electrolyte Solutions”, (Prof. Chau-Chyun Chen – Chemical Engineering)
- 2- **Yuan Li**, Ph.D. 2021, “Thermodynamic Modeling on Ion Removal Processes”, (Prof. Chau-Chyun Chen – Chemical Engineering)
- 3- **Xu Liu**, MS, “A study of the layer-by-layer films with properties of self-healing and UV-protection”, (Prof. Wei Li – Chemical Engineering)
- 4- **Xin Zhang**, Ph.D. 2021, “Modeling Ion Transport and Adsorption in a membrane Capacitive Deionization (mCDI) Cell”, (Prof. Danny Reible – Civil and Environmental Engineering)
- 5- **Uriel Garza-Rubalcava**, Ph.D. 2022, “Characterization of Relevant Sediment Processes Through High Resolution Passive Sampling”, (Prof. Danny Reible – Civil and Environmental Engineering)
- 6- **Ben Caudle** Ph.D. 2022, ”Design and validating a process model for the pyrolysis of biomass in a biorefinery”, (Prof. Chau-Chyun Chen – Chemical Engineering)
- 7- **Michael Sees** Ph.D. 2022, ”Best-Practices for Modeling Multicomponent Adsorption: Comparison of the Dual-Process and Generalized Langmuir Models”, (Prof. Chau-Chyun Chen – Chemical Engineering)
- 8- **Tianyu Chen**, Ph.D. 2022, “Dynamic Modeling for Membrane with Fixed Charge Groups in Membrane Separation Process”, (Prof. Danny Reible – Civil and Environmental Engineering)