ZHEYU JIANG

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EDUCATION

Ph.D., Purdue University, Chemical Engineering 2014 – 2018
Advisors: Rakesh Agrawal and Mohit Tawarmalani

B.Ch.E. (Honors), University of Minnesota 2010 – 2014
Advisor: Michael Tsapatsis

APPOINTMENTS

Oklahoma State University August 2021 – Present
Assistant Professor

- Leading the Computational Laboratory of Advanced Manufacturing and Sustainability (CLAMS) in the School of Chemical Engineering

The Dow Chemical Company/Corteva Agriscience July 2019 – July 2021
Research Investigator - Process Development Engineer

- Developed and optimized robust and cost-effective synthesis routes to deliver new fungicide products and reduced their solvent consumption by 60% and costs of manufacturing by 40%
- Conducted process development and optimization research to enable registration/launch for multiple crop protection actives and developed robust, cost-effective, and sustainable manufacturing technologies
- As the company's subject matter expert on liquid separations, designed, optimized, and implemented several novel solvent purification and recovery processes in the production of crop protection actives

Purdue University (Rakesh Agrawal Group) August 2014 – October 2018
Graduate Research Assistant

- Solved a longstanding problem in chemical engineering of developing a shortcut method for minimum reflux calculation for multicomponent distillation in multi-feed, multi-product columns
- Developed the first enumeration based global optimization algorithm to identify distillation configurations that can save up to 50% of total cost or total exergy loss compared to conventional schemes
- For the first time, proposed a systematic multi-layer approach for process intensification in multicomponent distillation, offering industrial practitioners an easy-to-follow recipe to synthesize numerous new and intensified configurations that further enhance operability, improve efficiency, and reduce costs

The Dow Chemical Company May 2016 – August 2016
PhD R&D Intern

- Synthesized novel multicomponent distillation sequences for several Dow's core processes that saved up to 10-15% in energy consumption and capital cost compared to current most effective technologies
- Hosted weekly meetings involving R&D, engineering, and business experts regarding potential innovation and retrofit opportunities for implementing these newly identified configurations

University of Minnesota (Michael Tsapatsis Group) November 2012 – May 2014
Undergraduate Research Assistant

- Developed the first solution processable method to achieve purification of sub-100 nm thin film of exfoliated MFI zeolite nanosheets using density gradient centrifugation
- Optimized experimental procedure that fabricated high-quality α-alumina membrane supports based on colloidal dispersion processing for MFI nanosheet coating
- Studied complete removal of organic structural directing agent in MFI nanosheets by acid treatment

Honeywell UOP June 2013 – August 2013
Engineering Support Specialist

- Created new UniSim based process simulations for UOP's Oleflex and FCC technologies and successfully built activity coefficient models to describe the VLE and LLE for all major components involved
- Established a crude oil thermodynamic properties databank for major global oil reserves

PROFESSIONAL SERVICE

Chair, Advances in Machine Learning, FOCAPO/CPC 2023 January 2023
Member, Chemical Engineering Faculty Search Committee, OSU 2021 – 2022

CURRENT PHD STUDENTS

Zeyuan Song Spring 2022 – Present
Saba Ghasemi Naraghi Spring 2022 – Present
Alireza Miraliakbar Spring 2023 – Present
Mehrdad Zomorodiyan (co-advised by Prof. Yu Feng) Spring 2023 – Present

DISSERTATION COMMITTEE

Suhao Chen (now Assistant Professor in Industrial Engineering at South Dakota Mines) Summer 2022

PEER-REVIEWED PUBLICATIONS

10. Song Z, Jiang Z. A data-driven random walk approach for solving water flow dynamics in soil systems. *Computer Aided Chemical Engineering*. 2023;52.
    - One of the 48 articles selected for oral presentation at FOCAPO/CPC 2023
9. Jiang Z. A shortcut model for multicomponent homogeneous azeotropic distillation. *Computer Aided Chemical Engineering*. 2023;52. forthcoming
8. Jiang Z, Tawarmalani M, Agrawal R. Minimum reflux calculation for multicomponent distillation in multi-feed, multi-product columns: Mathematical model. *AIChE Journal*. 2022;68:e17929.
    - One of the 17 invited articles in the 2022 Futures Issue of AIChE Journal
7. Jiang Z. A shortcut minimum reflux calculation method for distillation columns separating multicomponent homogeneous azeotropic mixtures. *Le Scientifique*. 2020;2020(1):17–25.
    - Featured in the inaugural issue of *Le Scientifique*, the peer-reviewed academic journal for Corteva scientists
6. Jiang Z, Chen Z, Huff J, Shenvi A, Tawarmalani M, Agrawal R. Global minimization of total exergy loss of multicomponent distillation configurations. *AIChE Journal*. 2019;65(11):e16737
5. Jiang Z, Mathew TJ, Huff J, Nallasivam U, Tawarmalani M, Agrawal R. Global optimization of multicomponent distillation configurations: Global minimization of total cost for multicomponent mixture separations. *Computers & Chemical Engineering*. 2019;126:249–262
4. Jiang Z, Agrawal R. Process intensification in multicomponent distillation: A review of recent advancements. *Chemical Engineering Research and Design*. 2019;147:122–145.
    - Invited review article in the special issue on 11$^{\text{th}}$ International Conference on Distillation & Absorption
3. Jiang Z, Madenoor Ramapriya G, Tawarmalani M, Agrawal R. Process intensification in multicomponent distillation. *Chemical Engineering Transactions*. 2018;69:841–846
2. Jiang Z, Madenoor Ramapriya G, Tawarmalani M, Agrawal R. Minimum energy of multicomponent distillation systems using minimum additional heat and mass integration sections. *AIChE Journal*. 2018;64(9):3410–3418
1. Agrawal KV, Topuz B, Jiang Z, Nguenkam K, Elyassi B, Francis LF, Tsapatsis M, Navarro M. Solution-processable exfoliated zeolite nanosheets purified by density gradient centrifugation. *AIChE Journal*. 2013;59(9):3458–3467.
    - Invited article in the special issue of AIChE Journal Founders Tribute to Neal R. Amundson

MANUSCRIPTS UNDER REVIEW

4. Jiang Z. Online monitoring of big data streams for robust, reliable fault detection of chemical processes
3. Jiang Z, Tawarmalani M, Agrawal R. Minimum reflux calculation for multicomponent distillation in multi-feed, multi-product columns: Optimization and case studies
2. Ghasemi Naraghi S, Jiang Z. Stochastic optimization of global agrochemical supply chains with risk management: modeling and reformulation
1. Ghasemi Naraghi S, Jiang Z. A data-driven approach for solving water flow dynamics in soil systems: Incorporating global random walk and machine learning in finite-volume discretization framework

WORKING MANUSCRIPTS

2. Xie J, Jiang Z, Yao B. The effect of different optimization strategies to physics-constrained deep learning for soil moisture estimation
1. Jiang Z, Tawarmalani M, Agrawal R. Quickly model and evaluate distillation columns

PATENTS

1. "Polymorphs of compounds having pesticidal activity". WO 2022/072650 A1, published on April 7, 2022

PRESENTATIONS

21. Jiang Z. AI applications in Chemical Process Industry. 2023. AIChE Spring Meeting, Houston, TX **(INVITED)**
20. Song Z, Jiang Z. A data-driven random walk approach for solving water flow dynamics in soil systems. 2023. The Foundations of Computer-Aided Process Operations and Chemical Process Control (FOCAPO/CPC) 2023 Conference, San Antonio, TX
19. Jiang Z. A shortcut model for multicomponent homogeneous azeotropic distillation. 2023. The Foundations of Computer-Aided Process Operations and Chemical Process Control (FOCAPO/CPC) 2023 Conference, San Antonio, TX
18. Jiang Z. Transforming junior-year separations course into an early-capstone learning experience. 2022. ASEE/AIChE Summer School for Engineering Faculty, Golden, CO
17. Jiang Z. Creating a sustainable manufacturing and food future via process systems engineering innovations. 2021. Oklahoma State University, Stillwater, OK **(INVITED)**
16. Jiang Z. Advancing future-generation separation technologies via systems engineering innovations: Multicomponent distillation and beyond. 2021. Oklahoma State University, Stillwater, OK **(INVITED)**
15. Jiang Z. Creating a sustainable food future by 2050 via systems engineering innovations. 2021. University of Wisconsin, Madison, WI **(INVITED)**
14. Jiang Z. Advancing future-generation separation technologies via process systems engineering innovations. 2021. University of Wisconsin, Madison, WI **(INVITED)**
13. Jiang Z. Innovating future-generation separation technologies via process systems engineering. 2020. Virtual AIChE Annual Meeting
12. Jiang Z. Innovating future-generation separation processes via systems engineering. 2020. Cornell University, Ithaca, NY **(INVITED)**
11. Jiang Z. Innovating future-generation separation processes via systems engineering: Multicomponent distillation and beyond. 2020. University of Wisconsin, Madison, WI **(INVITED)**

10. Jiang Z. Minimum reflux calculation for multicomponent azeotropic distillation using shortcut method. 2019. AIChE Annual Meeting, Orlando, FL
9. Jiang Z. A shortcut model for multicomponent azeotropic distillation column design. 2019. AIChE Annual Meeting, Orlando, FL
8. Jiang Z. A modeling approach to designing effective solvent exchange and recycle processes. 2019. Crop Protection Product Design & Process Summit, Indianapolis, IN **(INVITED)**
7. Jiang Z, Tawarmalani M, Agrawal R. Minimum reflux behavior of multicomponent mixture separation using complex distillation columns. 2018. AIChE Annual Meeting, Pittsburg, PA
6. Jiang Z, Tawarmalani M, Agrawal R. A new minimum reflux calculation method for multiple-feed distillation columns distilling ideal multicomponent mixtures. 2017. AIChE Annual Meeting, Minneapolis, MN
5. Jiang Z, Tawarmalani M, Agrawal R. Process intensification in multicomponent distillation. 2017. AIChE Annual Meeting, Minneapolis, MN
4. Jiang Z, Tawarmalani M, Agrawal R. Process intensification in multicomponent distillation. 2017. AIChE Spring Meeting, San Antonio, TX
3. Jiang Z, Madenoor Ramapriya G, Tumbalam Gooty R, Tawarmalani M, Agrawal R. Minimum energy of multicomponent distillation systems using minimum additional number of heat and mass integration sections. 2016. AIChE Annual Meeting, San Francisco, CA
2. Jiang Z, Madenoor Ramapriya G, Tumbalam Gooty R, Tawarmalani M, Agrawal R. Process intensification of multicomponent distillation configurations using minimum additional number of heat and mass integration sections. 2016. AIChE Annual Meeting, San Francisco, CA
1. Jiang Z, Madenoor Ramapriya G, Tumbalam Gooty R, Tawarmalani M, Agrawal R. A method for minimization of total exergy loss over the complete search space of regular distillation configurations. 2016. AIChE Annual Meeting, San Francisco, CA

HONORS AND AWARDS

Nomination for inclusion in the 2022 Futures Issue, AIChE Journal	2022
Ace of Innovation Award, Corteva Agriscience	2020
People's Choice Award, Corteva Agriscience	2019
AIChE Separations Division Graduate Student Research Award	2018
Eastman Graduate Travel Grant, Purdue University	2017
Purdue Graduate Student Government Travel Grant, Purdue University	2016
Global Excellence Scholarship, UMN	2010 – 2014
College of Science and Engineering Merit Scholarship, UMN	2012
Charles A. Mann Award, Department of Chemical Engineering, UMN	2012

TEACHING

Lead Instructor, CHE 2581 - ChemE Sophomore Seminar, OSU	Fall 2022
Lead Instructor, CHE 3113 - Rate Operations II, OSU (4.04/5.00)	Spring 2022
Co-Instructor, CHE 4124 - Chemical Engineering Design I, OSU (4.47/5.00)	Fall 2021
Teaching Assistant, CHE 450 – Design and Analysis of Process Systems, Purdue	Spring 2017
Teaching Assistant, CHE 378 – Heat and Mass Transfer, Purdue	Fall 2015

PROFESSIONAL SOCIETIES

American Institute of Chemical Engineers (AIChE), American Chemical Society (ACS), Institute of Industrial and Systems Engineers (IISE), Institute for Operations Research and the Management Sciences (INFORMS)