

ZISHU CAO

Assistant Professor

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EDUCATION

Ph.D. Chemical Engineering	2015-2020
University of Cincinnati	
Master's Chemical Engineering	2011-2014
University of Cincinnati	
Bachelor's Environmental Science	2007-2011
Lanzhou University, China	

RESEARCH INTERESTS

2D Materials, Membrane separation, Catalysis, Energy and sustainability

PROFESSIONAL EXPERIENCE

Aug 2022 to current	University of Texas at Tyler, Assistant Professor
Aug 2020 to July 2022	University of Cincinnati, Post-Doctoral Fellow

HONORS AND AWARDS

2022	Rising STARS Award, The University of Texas System
2019	ChE Graduate Student Award, University of Cincinnati
2019	Graduate Student of the Month, University of Cincinnati
2011	Outstanding Graduates of Lanzhou University

REFEREED JOURNAL PAPERS

1. Y. Sharma, D. Singh, **Z. Cao**, J. Gabski, J. Dong, An Anion Exchange Membrane of Layered Silicalite Nanosheets with Surface Quaternary Ammonium Cations, *ChemComm* 2025, 61, 4503.
2. **Z. Cao**, L. Iskhakova, X. Sun, J. Dong, A Study on the Synthesis and Proton Transport Behavior of Multilayered ZSM-5 Zeolite Nanosheet Membranes Laminated on Polymer Substrates, *Membranes* 2023, 13, 305.
3. L. Iskhakova, **Z. Cao**, X. Sun, J. Gabski, J. Dong, Preactivated Zeolite Nanosheet Plate-tiled Membrane on Porous PVDF Film: Synthesis and Study of Proton-Selective Ion Conduction, *J. Membr. Sci.* 2023, 669, 121328.
4. X. Sun, D. Damma, **Z. Cao**, N. T. Alvarez, V. Shanov, A. Arvanitis, P. G. Smirniotis, and J. Dong, CO-Promoted Low-Temperature Conversion of CH₄ to Hydrogen and Carbon Nanotubes on Nanocrystalline Cr-Doped Ferrite Catalyst, *Catalysis Communications* 2022, 169, 106475.
5. **Z. Cao**, L. Iskhakova, X. Sun, N. D. Anjekar, S. Yang, J. Dong, Self-Seeded Growth of Very Large Open-Structured Zeolite Nanosheet Assemblies with Extraordinary Micropore

Accessibility, *Microporous Mesoporous Mater.* 2022, 336, 111854.

6. **Z. Cao**, N. D. Anjkar, S. Yang, Small-Pore Zeolite Membranes: A Review of Gas Separation Applications and Membrane Preparation, *Separations* 2022, 9, 47.
7. **Z. Cao**, L. Iskhakova, X. Sun, Z. Tang, J. Dong, ZSM-5 Zeolite Nanosheet-Based Membranes on Porous Polyvinylidene Fluoride for High-Flux Desalination, *ACS Appl. Nano Mater.* 2021, 4, 2895-2902.
8. J. Chai, A. Lashgari, **Z. Cao**, C. K. Williams, X. Wang, J. Dong, J. Jiang, PEGylation-Enabled Extended Cyclability of a Non-aqueous Redox Flow Battery, *ACS Appl. Mater. Interfaces* 2020, 12, 15262-15270.
9. **Z. Cao**, S. Zeng, Z. Xu, A. Arvanitis, S. Yang, X. Gu, J. Dong, Ultrathin ZSM-5 Zeolite Nanosheet Laminated Membrane for High-Flux Desalination of Concentrated Brines, *Science Advances* 2018, 4: eaau8634.
10. I. Michos, **Z. Cao**, Z. Xu, W. Jing, J. Dong, Investigations on Mesoporous Glass Membrane as Ion Separator for Redox Flow Battery, *Batteries* 2019, 5, 6.
11. S. Zeng, A. Trontz, **Z. Cao**, H. Xiao, J. Dong, Characterizing the Gas Adsorption-Dependent Dielectric Constant for Silicalite Nanoparticles at Microwave Frequencies by a Coaxial Cable Fabry-Pérot Interferometric Sensing Method, *Madridge J. Nanotechn. Nanosci.* 2018, 3, 100-107.
12. Z. Zhang, M. Taylor, C. Collins, S. Haworth, Z. Shi, Z. Yuan, X. He, **Z. Cao**, Y. C. Park, Light-Activatable Theranostic Agents for Image-Monitored Controlled Drug Delivery, *ACS Appl. Mater. Interfaces* 2018, 10, 1534-1543.
13. S. Yang, A. Arvanitis, **Z. Cao**, X. Sun, J. Dong, Synthesis of Silicalite Membrane with an Aluminum-Containing Surface for Controlled Modification of Zeolitic Pore Entries for Enhanced Gas Separation, *Processes* 2018, 6, 13.
14. Z. Xu, I. Michos, **Z. Cao**, W. Jing, X. Gu, K.R. Kinkel, S. Murad, J. Dong, Proton-Selective Ion Transport in ZSM-5 Zeolite Membrane, *J. Phys. Chem. C* 2016, 120, 26386-26392.
15. S. Yang, **Z. Cao**, A. Arvanitis, X. Sun, Z. Xu, J. Dong. DDR-Type Zeolite Membrane Synthesis, Modification and Gas Permeation Studies, *J. Membr. Sci.* 2016, 505, 194-204.
16. **Z. Cao**, S. Yang, X. Sun, A. Arvanitis, J. Dong, Colloidal Silicalite Coating for Improving Ionic Liquid Membrane Loading on Macroporous Ceramic Substrate for Gas Separation, *J. Membr. Sep. Techn.* 2016, 5, 25-37.
17. R. Yang, **Z. Cao**, S. Yang, I. Michos, Z. Xu, J. Dong Colloidal Silicalite-Nafion Composite Ion Exchange Membrane for Vanadium Redox-Flow Battery, *J. Membr. Sci.* 2015, 484, 1-9.
18. H. Jiang, **Z. Cao**, R. Yang, L. Yuan, H. Xiao, J. Dong. Synthesis and Study of MgAl_2O_4 Spinel Thin Film as Sapphire Fiber Cladding for High Temperature Applications, *Thin Solid Films* 2013, 539, 81-87.

PATENT

1. J. Dong, **Z. Cao**, L. Iskhakova, Methods for self-seeded hydrothermal growth of MFI zeolite nanosheets and nanosheet assemblies and for tiling nanosheet zeolite plates on polymer supports, *US Patent App.* 2025, 18727023

CONFERENCE PRESENTATIONS

1. D. Phanos, **Z. Cao**, Zwitterionic Polymer Membranes for the Separation of Biomass Derived Mixture, AICHE Annual Meeting, San Diego, CA, November 2-6, 2025.
2. E. Asare, F. Resende, **Z. Cao**, F. P. Alege, Thermal Conversion of Cotton Gin Byproducts into Liquid Fuels and High-Value Chemicals, San Diego, CA, November 2-6, 2025.
3. C. Defor, F. Resende, **Z. Cao**, Ni/HZSM-5 Nanosheets Bifunctional Catalysts for Hydrodeoxygenation of Lignin-Derived Phenolics, San Diego, CA, November 2-6, 2025.
4. **Z. Cao**, D. Phanos, C. Defor, O. Khan, S. Yang, Recovering Rare Earth Elements from Brine with Amino Acid-Anchored Two-Dimensional Materials, 41st Southern Biomedical Engineering Conference, Tyler, TX, September 11-14, 2025.
5. C. Defor, O. Khan, S. Yang, **Z. Cao**, Recovering Rare Earth Elements from Brine with Two-Dimensional Functional Materials, AICHE Annual Meeting, San Diego, CA, USA, October 27-31, 2024.
6. C. Defor, **Z. Cao**, The development of 2D zeolite for Energy and Environment Applications, 5th Annual East Texas Research Conference, Tyler, TX, April 12, 2024.
7. L. Iskhakova, **Z. Cao**, X. Sun, J. Dong, Fabrication of ZSM-5 Zeolite Nanosheet Tiled Membranes on Macroporous Polymer Substrates as Ion Separators for Redox Flow, AICHE Annual Meeting, Phoenix, AZ, November 13-18, 2022.
8. **Z. Cao**, L. Iskhakova, X. Sun, Z. Tang, J. Dong, Multilayered MFI-Zeolite Nanosheet Plates for Tiling Membranes on Porous Polyvinylidene Fluoride Substrates for Wastewater Desalination, AICHE Annual Meeting, Phoenix, AZ, November 13-18, 2022.
9. **Z. Cao**, L. Iskhakova, X. Sun, M. Tu, J. Dong, Porous Polytetrafluoroethylene Supported Silicalite Nanosheet Laminated Membrane Volatile Fatty Acid Separation from Anaerobic Bioreaction Broth, AICHE Annual Meeting, Phoenix, AZ, November 13-18, 2022.
10. **Z. Cao**, L. Iskhakova, X. Sun, J. Dong, ZSM-5 Zeolite Nanosheets Synthesis and Formation of Ultrathin Membranes for Ion Separation in Aqueous Redox Flow Batteries, The 16th International Conference on Inorganic Membranes, Taipei, June 28-30, 2022.
11. **Z. Cao**, L. Iskhakova, J. Dong, ZSM-5 Zeolite Nanosheet-Nafion Composite Membrane as an Ion Separator for Redox Flow Batteries, *AICHE Annual Meeting*, Virtual Online, 2020.
12. **Z. Cao**, J. Dong, MFI-Type Zeolite Nanosheets and Laminated Membranes for Ion Separation in Aqueous Solutions, *ChEE Seminar*, University of Cincinnati, 2020.
13. **Z. Cao**, S. Zeng, Z. Xu, A. Arvanitis, J. Dong, MFI-Type Zeolite Nanosheets Coated Ceramic Membranes for Brine Pervaporation Desalination, *North American Membrane Society Annual Meeting*, Lexington, 2018.
14. S. Yang, **Z. Cao**, J. Dong, DDR-Type Zeolite Membrane Synthesis, Modification, and Gas Permeation Studies, *International Conference on Inorganic Membranes*, Atlanta, 2016.

COURSES TAUGHT

CHEN 2320	Chemical Engineering Mechanics
CHEN 3310	Chemical Engineering Materials
CHEN 3330	Fluid Mechanics
CHEN 3340	Heat Transfer
CHEN 3360	Chemical Reaction Engineering