

Sponsors



10th Annual CBE Graduate Research Symposium



Hosted by:
University of Notre Dame
Chemical & Biomolecular Engineering
Graduate Student Organization

October 17-18, 2024
Dahnke Ballroom,
Duncan Student Center

Welcome

Overview

Welcome to the 10th Annual CBE Graduate Research Symposium!

The goal of the Chemical & Biomolecular Engineering (CBE) Graduate Research Symposium is to provide a forum for CBE graduate students and post-doctoral researchers to present their research, network with professionals from both industry and academia, and develop their professional identity.

Over the course of these two days, students will showcase research from a wide range of disciplines, including catalysis, energy and sustainability, nano-fluidics, micro-fluidics, simulation and theory, materials science, nanotechnology, and bioengineering. The symposium also features invited talks by experienced and renowned personalities in chemical engineering to provide a variety of perspectives on career development for chemical engineers pursuing a PhD.

As this event has continued to grow, so too has the impact on CBE graduate student professional development and sense of community.

Thank you for attending the CBE Graduate Research Symposium.

Organizers

Symposium Committee



Montana Carlozo



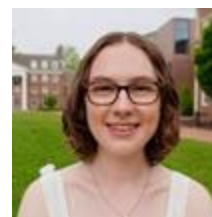
Fathya Salih



Hailey Lynch



Wilson Raney



Molly Dougher



Jessica Komla



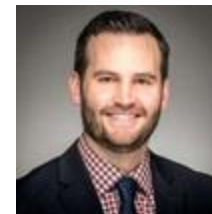
Vivian Okorie



Redemption Edegbe



Dr. William Schneider



Dr. William Phillip

Schedule of Events

October 17, 2024

1:15 PM

Arrival and Sign-in

1:35 PM

Opening Remarks

1:45 PM

10th Anniversary Progress Video

2:05 PM

Keynote Speaker: Dr. Kishori Deshpande

2:50 PM

Break and Refreshments **

3:05 PM

Student Presentations (Group 1)

3:35 PM

Industry Panel & Mini Career Fair

5:00 PM

Student Presentations (Group 2)

5:30 PM

Dinner and Networking

6:30 PM

End of Day 1 Events

October 18, 2024

8:30 AM

Poster Set-up, Check-in, and Breakfast

9:30 AM

Poster Session 1

11:15 AM

Keynote Speaker: Dr. Adrienne Minerick

12:00 PM

Lunch Break **

1:15 PM

Poster Session 2

3:00 PM

Group Photo & Refreshments **

3:30 PM

Poster Awards and Closing Remarks

4:00 PM

End of Day 2 Events

**** During breaks throughout the day, the self-service headshot station will be available on the 5th floor of Duncan.**

Invited Speakers



Dr. Adrienne Minerick

*Professor of Chemical Engineering
Michigan Technological University*

About the Speaker

Adrienne Minerick is a Distinguished Professor of Chemical Engineering and Director of ADVANCE at Michigan Technological University. She earned her B.S. from Michigan Tech and her M.S. and Ph.D. from the University of Notre Dame. Her administrative experience includes serving as Associate Dean for Research and Innovation in the College of Engineering, Assistant to the Provost for Faculty Development, Dean of the School of Technology, founding Dean of the College of Computing, and Interim Dean of the Pavlis Honors College. Adrienne completed her Presidential terms with the American Society for Engineering (ASEE) in June 2023. She is a fellow of the American Association for the Advancement of Science (AAAS), ASEE, and, most recently, the American Institute of Chemical Engineers (AIChE). Adrienne has led and/or helped establish three formal faculty mentoring programs, the Safe Zone workshops at ASEE, the Year of Action on Diversity, and served as President during the Year of Impact on Racial Equity. She earned the AES Electrophoresis Society's Lifetime Achievement Award in 2022 and was a prior Michigan Professor of the Year Nominee, which illustrates her dual passion for leveraging research and education for student growth and societal advances. While directing the Micro Medical Device Engineering Research Laboratory (mM.D. – ERL), she has managed, as PI or co-PI, ~\$14.9 million, yielding 104 research graduates*, a patent, and >110 publications [*12 PhDs (64% women, 18%UR)].



Dr. Kishori Deshpande

*Senior Research Scientist
Dow*

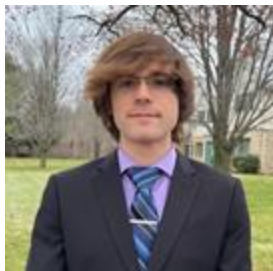
About the Speaker

Dr. Kishori Deshpande is a Senior Research Scientist in Catalyst and Process Research & Development group in Packaging and Specialty Plastics business at Dow. Her research focuses on manufacturing robustness of catalyst manufacturing assets, process design and reactor scale up for sustainable processing of new builds and developing fundamental understanding of gas phase polyethylene reactions. She has leveraged her reaction engineering and process scale up expertise for energy efficient processing of various chemicals used in Packaging and Specialty Plastics, Polyurethanes, Electronic Materials, and Agrosience applications. Dr. Deshpande was a post-doctoral researcher at Massachusetts Institute of Technology and received her Ph.D. in Chemical Engineering from University of Notre Dame. She holds a Bachelor's degree in Chemical Technology from University Institute of Chemical Technology, Mumbai.

Dr. Deshpande is an inventor of 48 granted patents and has authored 15 publications as well as a book chapter. She is a recipient of various awards including the AIChE Process Development Practice Award, Institution of Chemical Engineers Industry Project Award, Dow Excellence In Science Award, University Institute of Chemical Technology Distinguished Alumni Award (Research), and American Chemical Society Volunteer of the Year Award. Outside work, she likes to spend time with her two children, scuba dive with her husband, and practice Taekwon Do.

Oral Presentations

Group 1 – 3:05-3:35pm



In Vivo Molecular Interactions Between SERCA and Piezo in Parkinson's Disease

David Gazzo
Zartman Lab



Exploring the Homebound Journey of Exosomes with Chiral Fluorescent Quantum Dots

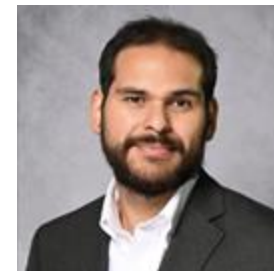
Gaeun Kim
Wang Lab



Engineering Granular Hydrogels for Lymphatic Vasculature Formation: Effect of Gels Morphology on the Development of Perfusable Vasculature Constructs

Daniel Montes Pinzon
Chang Lab

Group 2 – 5:00-5:30pm



Cu Reduction Mechanism in H₂-TPR and Implications for Cu Distribution in Cu-CHA

Jose Rebolledo-Oyarce
Schneider Lab



Opportunity in Structural Design of Amine Modified Polymer of Intrinsic Microporosity for Highly Selective Olefin/Paraffin

Separation
Cynthia Chen
O'Brien Lab



Biomimetic Hydrogel-based Platform for High-Yield Engineered Organoid Culture and High-Content Drug Testing

Hyunsu Jeon
Wang Lab

Poster Presentations

Session 1 – 9:30-11:15am

P.N.	Presenter	Advisor(s)	Poster Title
2	Tiger Shi	Hsueh-Chia Chang	Quantifying Enzymatic Small Extracellular Vesicles (sEVs) for Metastatic Cancer Staging via Magnetic Nanoporous Membrane (MNM) Activity Assay
4	Alba Scotto d'Apollonia	Jason Hicks	Polyoxometalates as Platforms for the Design of Single Site Catalysts for Light Olefin Oligomerization
6	Xinhe Chen	Alexander Dowling	Beyond Price-Taker: Multiscale Optimization of Wind and Battery Integrated Energy Systems
8	Piyush Deshpande	Jennifer Schaefer	Characterizing Sulfur Copolymer Composite Cathodes for All-Solid Batteries
10	Damian Agi	Alexander Dowling	Process modeling and technoeconomic assessment of biogas reforming pathways for low-carbon ammonia production
12	Bernice Webber	Matthew Webber	Polymer Nanoparticle Hydrogel Systems for Ultra-Long Insulin Delivery
14	Denver Haycock	William Schneider	Use of Kinetic Modeling to Probe the Chemical Opportunities in an Ethane Nonthermal Plasma
16	Audrey Hansrisuk	Matthew Webber	Development of a supramolecular hydrogel for prime-boost vaccine delivery
18	Orlando A. Mendible Barreto	Yamil Colón	Considerations in the Use of ML Interaction Potentials for Free Energy Calculations
20	Jun Wang	Merlin Bruening	Combined Nanofiltration and Diafiltration for Isolation of Rare-earth Ions

Poster Presentations

Session 1 – 9:30-11:15am

P.N.	Presenter	Advisor(s)	Poster Title
22	James Magas	Nosang Myung	Copper(II) Oxide and Tin(IV) Oxide Hetero-Nanostructures: Use in Detection of SO ₂ , Acetone, and NO ₂ Analytes
24	Joseph Emery	Ruilan Guo	Penttiptycene-based polybenzimidazole membranes for High-Temperature H ₂ /CO ₂ separation
26	Wilson Raney	Yamil Colón	Mapping the Design Space of Metal-Organic Frameworks As a Platform for Entangled Photon Pair Generation
28	Liting Wang	Ruilan Guo	Development of Novel Polymer Membrane Platform via Friedel-Crafts Hydroxy Alkylation Polymerization
30	Andrew Marquardt	Brett Savoie	Optimizing the Design of Cyclable Polydienes using a Genetic Algorithm
32	Kingsley Safo	Ruilan Guo	Novel Functional and Clickable Poly (Arylene Ether Sulfone) Membrane Platform for Water Purification
34	James Johnston	Yichun Wang	Piezoelectric biomaterials for enhancing the production of small extracellular vesicles
36	Annabelle Li	William Phillip	Development of Block Copolymer Adsorptive Membranes for PFAS Removal
38	Anna Luce	Casey O'Brien	Molecular-Level Characterization of Facilitated Transport Membranes through Expansion of Operando Transmission FTIR Spectroscopy Technique

Poster Presentations

Session 2 – 1:15-3:00pm

P.N.	Presenter	Advisor(s)	Poster Title
1	Rachel Ollier	Matthew Webber	Strain-Stiffening Mechanoresponse in Dynamic-Covalent Cellulose Hydrogels
3	Stephen Cini	Alexander Dowling	Design of experiments facilitates development of digital twins in systems biology
5	Laurianne Lair	William Phillip	High-throughput experiments elucidate the effect of multicomponent feed streams on solute transport
7	Amish Chovatiya	William Schneider	Conversion Dependence of Catalytic Ammonia Oxidation Over Platinum and its Implications in a Diesel Engine Aftertreatment System
9	Agboola Suleim	Ruilan Guo	Iptycene-based polybenzoxazole membranes for high-temperature hydrogen separations
11	Steven Yeo	William Schneider	A Molecular Approach on quantifying the rate of dealumination
13	Alex Sinclair	Hsueh-Chia Chang	Immunojanus Particles Characterize Surface Markers of Small Extracellular Vesicles in Low-Volume, Untreated Biofluids for Cancer Identification
15	James Carpenter	Yamil Colón	Adsorption in Flexible Soft Porous Coordination Polymers
17	Tiago Thomaz Migliati Zanon	Yichun Wang	Metastasis Prostate Cancer Spheroids Model in High-Throughput High-Content Domain
19	Fernando Carmona Esteva	Yamil Colón, Edward Maginn	Structure-Property Relationships for the Thermophysical Properties of Ionic Liquids Under External Electric Fields

Poster Presentations

Session 2 – 1:15-3:00pm

P.N.	Presenter	Advisor(s)	Poster Title
21	Connor Schmidt	Matthew Webber	The Novel Modulation of Crosslinking Mechanisms in Hydrogels
23	Sandra Weber	Ruilan Guo	Organosoluble Pentiptycene-based Polybenzoxazoles for High Temperature Gas Separations
25	Russell Clarke	Jason Hicks	Nonthermal Plasma-Activated Strong Metal-Support Interactions for Tuning Catalyst Performance
27	Jizhou Jiang	Jennifer Schaefer	Nanoscale structure control and high-fidelity characterization of molecular layer-by-layer assembled thin film
29	Pratham Singh	William Phillip	Exploring Diafiltration Application for Critical Mineral Recovery from Spent Lithium Ion Battery
31	Alejandro Chaperoplanell	Casey O'Brien	Design of Amine-Based Catalytic Polymeric Membranes through Structural Modification for Integrated CO ₂ Capture and Conversion
33	Raeleen Sobetski	Basar Bilgicer	Evaluation of selective uptake of Multiple Myeloma Surface Marker (MSM)-Targeted Nanoparticles by Multiple Myeloma(MM) Cells
35	Shukun Zhong	William Phillip	Employ 3D-printing technique to improve the sorbent capacity and diffusion rate
37	Farbod Shirinichi	Yichun Wang	Tuning Chirality of Graphene Quantum Dots