



3<sup>rd</sup> Annual Graduate Research Symposium



William G. Lowrie Department of  
Chemical and Biomolecular  
Engineering

The Ohio State University

**Handbook**

**2014**

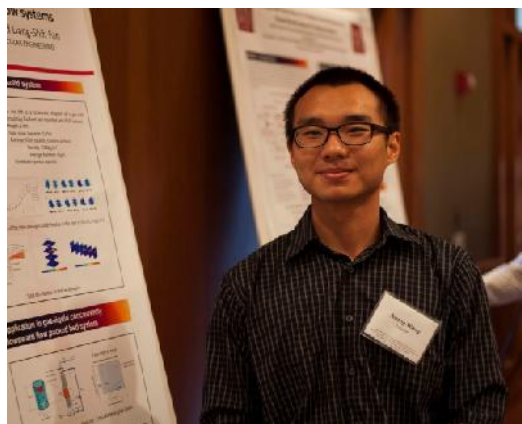


# 3<sup>rd</sup> Annual Graduate Research Symposium 2014

Sponsored by The Dow Chemical Company



Organized by William G. Lowrie Department of  
Chemical and Biomolecular Engineering



Welcome to the 3<sup>rd</sup> Annual Graduate Research Symposium, organized by graduate students in the William G. Lowrie Department of Chemical and Biomolecular Engineering and sponsored by the Dow Chemical Company!

The symposium is a day-long event showcasing the exemplary research conducted in our department through presentations made by our graduate students. It is an excellent opportunity to engage with the research happening here, as well as network with graduate students, faculty, and representatives from the university and industries.

This handbook and the accompanying materials will guide you through the day's agenda. We look forward to your participation throughout the day. Thank you for joining us; we hope you enjoy the symposium!

## Keynote Speaker

Michael Dickens, Ph.D., is the General Manager of Identity Management at Battelle, a position he assumed in 2002, where he is responsible for biological threat agent characterization, detection, and analysis.

After graduating with his B.S. in microbiology from the Ohio State University, Mike had to make a choice between professional/grad school or industrial R&D. He initially chose the industrial route, becoming the lead microbiologist at J.M. Smucker for two years. Mike started his graduate career first at Case Western Reserve working on his M.S. in biochemistry where he studied cystic fibrosis, but transferred to OSU to work on his PhD focusing on the microbiology, molecular biology and biochemistry of daunorubicin biosynthesis. His research, which resulted in 10 publications and 2 patents, helped him to avoid the post-doc route even though he was offered two.

He landed at Merck & Co. right out of grad school working in vaccine manufacturing. Later he transferred to bioprocessing R&D in the eastern PA/NJ area and for 5 years he built and led a team of molecular biologists to enhance production processes. After 9/11, which he watched from the rooftop of the parking garage at Merck, he decided to get back to his Ohio roots. Mike's route took him to his current employer, Battelle, where he has worked his way up over the past 12 years from a Research Scientist to General Manager of a new start up business focused on applied genomics. Mike has also been a visiting lecturer at OSU's Dentistry School for the past 7 years, delivering lectures in Medical Biochemistry and Medical Microbiology.



**Michael Dickens**  
*General Manager of  
Identity Management  
at Battelle*

**Battelle**  
*The Business of Innovation*



## William G. Lowrie Department of Chemical and Biomolecular Engineering



The William G. Lowrie Department of Chemical and Biomolecular Engineering was recently ranked #23 in chemical engineering programs by the 2015 U.S News and World report. A total of 198 B.S., M.S., and Ph.D. students graduated from the department in the academic year 2013 – 2014. The department provides its graduate students with a world class innovative research program in the areas of:

- Bioengineering, Biotechnology, and Membranes
- Colloids, Aerosols, and Particle Technology
- Fluid Mechanics and Multiphase Flow
- Molecular Thermodynamics and Simulation
- Polymers and Nanomaterials
- Reaction Engineering and Catalysis
- Energy and Sustainability



### CBEC Building

Located in the heart of the science and engineering neighborhood at Ohio State, the new 225,000 sq.ft. Chemical and Biomolecular Engineering and Chemistry (CBEC) building is expected to be completed by October 2014. The building will have ample laboratory space with a state of the art research environment. In addition to being awarded a LEED silver certification, it will also adopt the sustainable design practices by Labs 21.

The new CBEC building complex is conceived as a community of scientists, engineers, postdoctoral fellows, graduate students, and technical staff working collaboratively in diverse research areas in Chemical & Biomolecular Engineering and Chemistry.

The labs will begin functioning in November 2014, and classes are scheduled starting in Spring 2015. The grand opening ceremonies will be on the 9<sup>th</sup> & 10<sup>th</sup> of April 2015!



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## EVENT SCHEDULE



Monday, September 22, 2014, The Blackwell Inn

Time	Event	Venue
8:00 – 8:45 AM	Breakfast/Registration*	Room 140, Pfahl Hall
8:45 – 9:00 AM	Opening Remarks – Dept Chair Stuart Cooper	Room 140, Pfahl Hall
9:00 – 9:30 AM	Keynote Address – Michael Dickens, PhD (Battelle)	Room 140, Pfahl Hall
9:30 – 10:45 AM	Oral Presentations – Session 1	Room 140, Pfahl Hall
10:45 – 11:00 AM	Break	
11:00 AM – 12:15 PM	Oral Presentations – Session 2	Room 140, Pfahl Hall
12:15 – 1:00 PM	Lunch	Grand Ballroom, The Blackwell Inn
1:00 – 3:00 PM	Poster Session**	Grand Ballroom, The Blackwell Inn
3:00 – 4:00 PM	Reception/Informal Networking	Grand Ballroom, The Blackwell Inn

\*Registration will be open all day, but will be moved to outside the Ballroom at The Blackwell after the oral presentations.

\*\*In addition to the dedicated session, posters will be open for viewing during Lunch and Reception.



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## ORAL PRESENTATION SCHEDULE



9:30 AM – 12:15 PM | Room 140 Pfahl Hall

Session Chair: **Elif Eda Miskio lu**

Time	Abstract #	Presentation Title
9:30 – 9:45 AM	D.1	Polymer/Inorganic Composite Membranes with Different Compositions for CO <sub>2</sub> Capture from Flue Gas <b>Yuanxin Chen</b>
9:45 - 10:00 AM	A.2	Magnetic property analysis of cells with single-cell magnetophoresis <b>Wei Xue</b>
10:00 - 10:15 AM	B.4	Chemisorption and Oxidation of CO on PdO(101) from Density Functional Calculations <b>Li Pan</b>
10:15 - 10:30 AM	E.1	Bridging the gap between LCA and PSE via a framework for multi-scale sustainable process design <b>Rebecca J. Hanes</b>
10:30 – 10:45 AM	B.6	Incorporation of binder to NO <sub>x</sub> reduction catalyst for washcoat development <b>Sreshtha S. Majumdar</b>
10:45 - 11:00 AM	BREAK	
11:00- 11:15 AM	A.7	Multi-parameter Evaluation of Heterogeneous Circulating Tumor Cells -- Combined RNA in situ Hybridization, Immunofluorescent Analysis <b>Yongqi Wu</b>
11:15 - 11:30 AM	B.5	Kinetics of High Pressure Redox Reactions for Fe-based Chemical Looping Technology for Methane and Syngas Conversion <b>Niranjani Deshpande</b>
11:30 – 11:45 AM	D.4	Scale-up fabrication of CO <sub>2</sub> -Selective Membranes and Techno-Economic Study of CO <sub>2</sub> -Selective Membranes in an IGCC power plant <b>Varun Vakharia</b>
11:45 - 12:00 PM	B.7	Characterization and Catalytic Activity for Ethanol Steam Reforming on CeO <sub>2</sub> <b>Hyuntae Sohn</b>
12:00 - 12:15 PM	A.3	Control of Intein-mediated Recombinant Protein Purification in a Mammalian Cell Expression System <b>Tzu-Chiang Han</b>



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## POSTER PRESENTATIONS



1:00 – 3:00 PM | Grand Ballroom, The Blackwell Inn

Abstract #	Presentation Title	Abstract #	Presentation Title
<b>A.1</b>	Partitioning of sRNA gene-regulatory activity between two mRNA target transcripts: “Detargeting” of DsrA <b>Samuel D. Stimple</b>	<b>B.1</b>	A Comparison of Non-noble Metal Cathode Catalysts for Proton Exchange Membrane Fuel Cells (PEMFCs) <b>Kuldeep Mamtani</b>
<b>A.4</b>	Development of biosensors to identify new chemicals against dengue fever vectors <b>Miriam Shakalli</b>	<b>B.2</b>	Electrocatalytically-assisted oxidative dehydrogenation of lower alkanes to olefins <b>Anshuman Fuller</b>
<b>A.5</b>	Delivery of Interleukin and Hemoglobin-Haptoglobin Complexes to Accelerate Wound Healing <b>Kristopher Richardson</b>	<b>B.3</b>	Methane to methanol conversion: Using paired acid sites in microporous materials <b>Nitish Deshpande</b>
<b>A.6</b>	Structure-based in silico modeling of chemically induced toxic <b>Darshan Mehta</b>	<b>C.1</b>	Surface Freezing of n-alkanes: Experimental and MD Studies <b>Viraj P. Modak</b>
<b>A.8</b>	Identification and Characterization of CTCs in Head and Neck Squamous Cell Carcinoma <b>Kyoung-Joo Jenny Park</b>	<b>C.2</b>	Multiple Phases of Block Copolymer Micelles formed via Electrospray-Enabled Interfacial Instability <b>Matthew Souva</b>
<b>A.9</b>	Fermentative production of malic acid and poly(L-malic acid) by Aureobasidium pullulans from biomass <b>Chi Cheng</b>	<b>D.2</b>	Investigating Crystallization Mechanisms of Microporous Materials Using Ion Mobility-Mass Spectrometry (IM-MS) <b>Aamena Parulkar</b>
<b>A.10</b>	Metabolic Engineering of Cellulolytic Clostridium cellulovorans for Biofuel Production from Lignocellulosic Biomass <b>Xiaorui Yang</b>	<b>D.3</b>	Synthesis and Characterization of Nanoporous Polyethersulfone Membrane via Vapor and Non-solvent Induced Phase Inversion <b>Dongzhu Wu</b>



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1:00 – 3:00 PM | Grand Ballroom, The Blackwell Inn

Abstract #	Presentation Title	Abstract #	Presentation Title
D.6	Novel Membrane Structures and Compositions for CO <sub>2</sub> /H <sub>2</sub> Separation Applications <b>Witopo Salim</b>	D.11	Developing CVD Carbide-bonded Graphene Coating for Thermal Management Applications <b>Paul Garman</b>
D.7	Molecular Dynamics Simulations of Microphase Separating Tapered Diblock Copolymers <b>Youngmi Seo</b>	E.2	Dynamics of Ethane Confined in Nanoporous Controlled Pore Glass <b>Sumant Patankar</b>
D.8	Effect of Aggregation on the Mechanical Properties of Ionomers from Molecular Dynamics Simulations <b>Janani Sampath</b>	E.3	Towards sustainable chemical processes as networks of technological and ecological systems <b>Varsha Gopalakrishnan</b>
D.9	Small Angle Scattering studies of nanoparticle packing into block copolymer micelles <b>Gauri Nabar</b>		