AIChE®

MIDWEST REGIONAL CONFERENCE

12th Annual AIChE Midwest Regional Conference

March 11-12, 2020

Illinois Institute of Technology

(Hermann Hall)

Organized by the AIChE Chicago Local Section and hosted by the Illinois Institute of Technology

Armour College of Engineering

ILLINOIS INSTITUTE OF TECHNOLOGY

AIChE Chicago

AIChE Midwest Regional Conference

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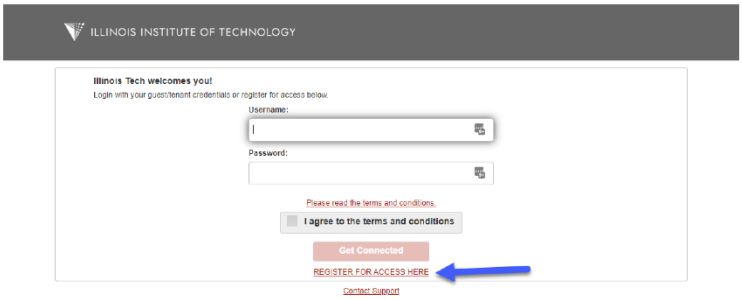

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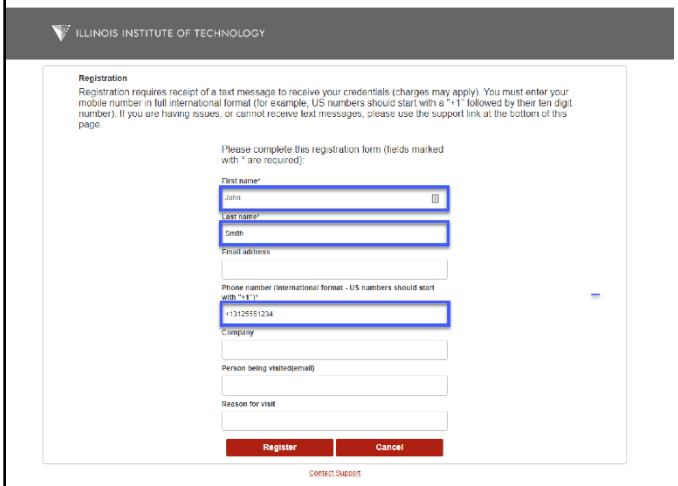

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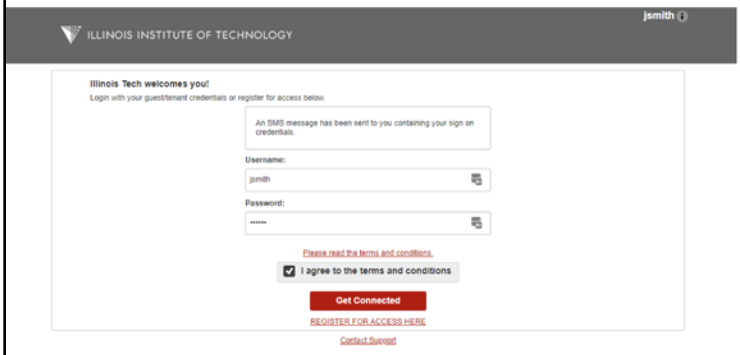

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How do I find the Presentation Abstracts?

1) Go to the conference website - **https://tinyurl.com/MRC12-2020**
2) Open the link "Book of Abstracts"

AIChE Midwest Regional Conference

Conference Sponsors

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AIChE Midwest Regional Conference

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Conference Overview

The AIChE Midwest Regional Conference (MRC) continues into its 12th year. Organized by the **AIChE Chicago Local Section** with support from AIChE Technical Programming and hosted by the **Illinois Institute of Technology**, the MRC provides an opportunity for engineers and scientists in the region to learn about new technologies and network with others in the field. A particular objective of the conference is to build technical relationships between industrial practitioners and researchers in the governmental and academic spheres. The technical program includes:

5 Keynote Lectures:

- **Jeff Garascia***, Chief Innovation Officer, Marmon Holdings*
- **Matthew Tirrell,** *Dean, Pritzker School of Molecular Engineering, University of Chicago*
- **Michael J. Graff,** *CEO, American Air Liquide*
- **Keith A. Couch,** *Senior Director, Honeywell UOP*
- **Edward Nam**, *Director Land, Chemicals and Redevelopment Division, US EPA Region 5*

The conference contains **17 technical sessions** featuring over **80 oral presentations** as well as **3 career development sessions**. The Thursday evening program is combined with the ***AIChE Chicago Local Section Monthly Meeting***.

The conference also features a **Student Outreach Program**, where Chicago-area high school students will become acquainted with the various facets of the chemical engineering profession. The outreach program features **Lester McCarroll** (GP Ventures) as keynote speaker and includes a special luncheon where students can interact with practicing chemical engineers.

On behalf of the conference planning committee, we welcome you to the 12th Annual AIChE Midwest Regional Conference and hope you will take advantage of all the opportunities it has to offer.

Jeffrey Zalc
Conference Chair
BP Refining Technology & Engineering

AIChE Midwest Regional Conference

Program at a Glance

Wednesday, March 11, 2020

7:30 AM - 10:30 AM	**Continental Breakfast** (Ballroom)
8:30 AM – 9:30 AM	**Morning Keynote** (Ballroom) - Jeff Garascia*, Chief Innovation Officer, Marmon Holdings*
9:30 AM – 9:45 AM	**Networking Break**
9:45 AM – 11:30 AM	**Technical Sessions** - *Catalysis and Reaction Engineering I* (Alumni Lounge) - *Industrial Crystallization I* (Hermann Lounge) - *Transport Phenomena* (Ballroom)
11:30 AM – 12:30 PM	**Lunch with High School Outreach Participants** (Ballroom and Expo Room)
12:45 PM – 1:45 PM	**Afternoon Keynote** (Ballroom) - Matthew Tirrell*, Dean, Pritzker School of Molecular Engineering, University of Chicago*
1:45 PM – 2:00 PM	**Networking Break**
2:00 PM – 3:45 PM	**Technical Sessions** - *Catalysis and Reaction Engineering II* (Alumni Lounge) - *Industrial Crystallization II* (Hermann Lounge) - *Workshop Session: How to Engineer Your Success* (Ballroom)
3:45 PM – 4:00 PM	**Networking Break**
4:00 PM – 5:45 PM	**Technical Sessions** - *Process Engineering and Optimization* (Alumni Lounge) - *Biomedical Engineering* (Hermann Lounge) - *Product and Process Characterization* (Ballroom) - *Job Search Skills* (Expo Room)
5:45 PM – 6:00 PM	**Networking Break**
6:00 PM – 7:30 PM	**Poster Session** (Gallery Lounge)
7:30 PM – 9:30 PM	**YP Social** (Off Site - **Fat Fish Bar & Grill**)

AIChE Midwest Regional Conference
Program at a Glance

Thursday, March 12, 2020

7:30 AM - 10:30 AM	**Continental Breakfast** (Ballroom)
8:30 AM – 9:30 AM	**Morning Keynote** (Ballroom) - Michael J. Graff*, CEO, American Air Liquide*
9:30 AM – 9:45 AM	**Networking Break**
9:45 AM – 11:30 AM	**Technical Sessions** - *Bio-films* (Alumni Lounge) - *Energy and Sustainability* (Hermann Lounge) - *Multiphase Modeling and Simulation* (Ballroom)
11:30 AM – 12:30 PM	**Lunch with High School Outreach Participants** (Ballroom and Expo Room)
12:45 PM – 1:45 PM	**Afternoon Keynote** (Ballroom) - Keith A. Couch*, Senior Director, Honeywell UOP*
1:45 PM – 2:00 PM	**Networking Break**
2:00 PM – 3:45 PM	**Technical Sessions** - *Refining & Petrochemical Technology* (Alumni Lounge) - *Electrochemical Engineering I* (Hermann Lounge) - *Directed Self-assembly of Nanostructures* (Ballroom) - *Job Search Essentials* (Expo Room)
3:45 PM – 4:00 PM	**Networking Break**
4:00 PM – 5:45 PM	**Technical Sessions** - *Process and Environmental Safety* (Alumni Lounge) - *Electrochemical Engineering II* (Hermann Lounge) - *Panel Session: Big Data in Industry and Academia* (Ballroom)
5:45 PM – 6:00 PM	**Networking Break**
6:00 PM – 6:45 PM	**Local Section Dinner Reception** (Ballroom)
6:45 PM – 7:30 PM	**Local Section Dinner** (Ballroom)
7:30 PM – 8:30 PM	**Dinner Keynote** (Ballroom) - Edward Nam, Director Land, Chemicals and Redevelopment Division, US EPA

AIChE Midwest Regional Conference
Keynote Speakers

Wednesday Morning Keynote: 8:30 AM March 11, 2020

Jeff Garascia, *Chief Innovation Officer, Marmon Holdings*

Presentation Title: **Innovating with External Partners**

Biographical Sketch: Jeff Garascia has been the Chief Innovation Officer of Marmon Holdings since July 2017. In this position, Jeff advises presidents of Marmon's ten operating sectors to help stimulate product innovation in their businesses, create new ideas and approaches, and identify innovation talent. Additionally, he is responsible for various "think tank" initiatives, the Marmon Innovation Council, and the Marmon Patent Society. Prior to this Jeff was the Senior Vice President, Growth & Innovation for Marmon Beverage Technologies, leading strategy and innovation teams in areas including engineering, product management, marketing, and consumer research, as well as the research and development center in India. Before joining Beverage Technologies in 2013, Jeff spent seven years with Scotts Miracle-Gro in senior management positions in global strategy, R&D, and business development. He previously was with the Booz, Allen & Hamilton consulting firm for eight years in progressive roles culminating in his appointment as a Principal in the firm. Jeff earned a B.S. in Electrical Engineering from the University of Houston and a M.S. and Ph.D. in Industrial Engineering, both from the University of Cincinnati.

Wednesday Afternoon Keynote: 12:45 PM March 11, 2020

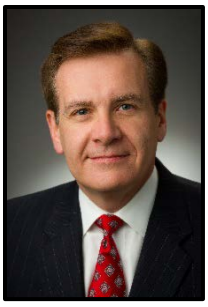
Matthew Tirrell*, Dean, Pritzker School of Molecular Engineering, University of Chicago*

Presentation Title: **Molecular Engineering: A New Take on Engineering Research and Education**

Biographical Sketch: *Matthew Tirrell's research has been in the fields of polymer interfaces, dynamics, fluid phase behavior and nanomedicine. He is particularly known for his work on polymer brushes, surface force measurement, peptide amphiphiles and polyelectrolyte complex phase behavior. In 2011, Matthew Tirrell was appointed as the founding Pritzker Director and Dean of the Faculty of the Institute for Molecular Engineering and established the first University of Chicago engineering program, which he continues to oversee (now the Pritzker School of Molecular Engineering). Professor Tirrell simultaneously served as Deputy Laboratory Director for Science (September 2015 - April 2018) and Chief Research Officer (January 2017 - March 2018) at Argonne National Laboratory. Immediately prior to joining the University of Chicago, he was the Arnold and Barbara Silverman Professor and Chair of Bioengineering at the University of California, Berkeley, as well as a Faculty Scientist appointment at the Lawrence Berkeley National Laboratory. Dr. Tirrell completed ten years as Dean of Engineering at the University of California, Santa Barbara on June 30, 2009. From 1977 to 1999, he was on the faculty of Chemical Engineering and Materials Science at the University of Minnesota, where he served as department head from 1994 to 1999. Tirrell received a B.S. in Chemical Engineering at Northwestern University in 1973 and a Ph.D. in 1977 in Polymer Science from the University of Massachusetts. He has co-authored about 400 papers and one book, has supervised about 100 Ph.D. students and 50 postdoctoral researchers. Professor Tirrell is a member of the National Academy of Engineering, the National Academy of Sciences, the American Academy of Arts & Sciences and the Indian National Academy of Engineering, and is a Fellow of the American Institute of Medical and Biological Engineers, the AAAS, and the American Physical Society.*

AIChE Midwest Regional Conferencs
Keynote Speakers

Thursday Morning Keynote: 8:30 AM March 12, 2020



Michael J. Graff, *CEO, American Air Liquide*

Presentation Title: **Science & Engineering as Drivers of the Future**

Biographical Sketch: *Mike Graff joined Air Liquide in 2007 and currently serves as executive vice president and on the executive committee of Air Liquide Group; chairman, chief executive officer and president of American Air Liquide Holdings, Inc. and chairman of the board of Airgas. Based in Houston, Graff leads business operations for the Americas and Asia-Pacific regions of Air Liquide Group and is the global chairman of the Group's Electronics business line. Graff is a senior executive with 35 years of global experience in the industrial gas, energy, refining, chemicals and polymers industries. He began his career with Amoco and BP, plc and served as president or chief executive officer of several global chemical and polymer businesses. Graff currently serves on the board of directors of Westlake Chemical Corporation as well as a number of industry and civic organizations, including the board and executive committee of the American Chemistry Council and chairman of its Responsible Care committee, the board of trustees of the Illinois Institute of Technology, the Engineering Advisory Council for Purdue University's College of Engineering, as a principal of the Bipartisan Policy Center's American Energy Innovation Council, a member of the National Petroleum Council and the United States Investment Advisory Council, the board of trustees for the George and Barbara Bush Foundation, the board of directors of Junior Achievement of Southeast Texas, the Leadership Council for Houston Methodist Hospital and is a member of the Baker Institute of Rice University. Graff holds a bachelor's degree in chemical engineering from the Illinois Institute of Technology and a master's degree in chemical engineering from Purdue University, and has been awarded recognition by both universities for his professional achievement and as a distinguished alumnus. He pursued his MBA at the University of Chicago and completed advanced studies at the Wharton School of the University of Pennsylvania, the University of Cambridge, and the Stanford University Law School. Along with his wife Rhonda, Graff participates in a diverse number of non-profit and community service organizations. He is a strong advocate for STEM education, literacy and youth athletics.*

Thursday Afternoon Keynote: 12:45 PM March 12, 2020

Keith A. Couch, *Senior Director, Honeywell UOP*

Presentation Title: **Refining/Petrochemicals Integration – Refinery of the Future**

Biographical Sketch: *Keith A. Couch is Senior Director of global Technology Sales and Integrated Project Solutions (IPS) teams within UOP's Petrochemicals & Refining Technologies (PRT) business. Keith's team spans the US, UK, India, China and Malaysia offices. The focus of the organization is to drive improved client value creation and business operations for both discrete and integrated projects. He has over 28 years of international experience that has included Manufacturing, R&D, Field Service, Technical Service, Technical Sales and Business Management. Keith is recognized as a technologist and author with 27 patents and 18 industry publications. He holds a B.S. degree in Chemical Engineering from Louisiana Tech University and a Master of Business Administration from the University of Chicago, Booth School of Business.*

Thursday Dinner Keynote: *7:30 PM March 12, 2020*

Edward Nam, *Director Land, Chemicals and Redevelopment Division, US EPA Region 5*

Presentation Title: ***EPA's Per- and Polyfluoroalkyl Substances (PFAS) Action Plan***

Biographical Sketch: Dr. Edward Nam has been the director of the Land, Chemicals and Redevelopment Division since July 2019. He had previously been the director of Region 5's Air and Radiation Division since 2016. Ed's career with EPA started in 2003. Prior to joining Region 5, he served as the director of the Light-Duty Vehicles and Small Engines Center and the Air Quality and Modeling Center in the Office of Transportation and Air Quality in Ann Arbor, Mich. In these roles, he managed the development of the motor vehicle emissions simulator and the mobile source emissions inventory model, and was a lead for two light-duty vehicle greenhouse gas rules. He also served as the EPA representative to the United Nations international harmonization of vehicle standards in Geneva, Switzerland. Prior to joining the EPA, Ed was a research scientist at Ford Motor Co. Ed earned his master's and doctoral degrees in physics from the University of Michigan, and a Bachelor of Arts in physics from the University of Pennsylvania.

AIChE Midwest Regional Conference
Session Presentations
Wednesday, March 11, 2020

Wednesday Morning Keynote Session
Wednesday, March 11, 2020 (HH 002)
8:30 AM **LS Chair's Welcome**
Jarad Champion (Geosyntec Consultants)
8:35 AM **Keynote Introduction**
Robert Tsai (UOP/Honeywell)
8:40 AM **Innovating with External Partners**
Jeff Garascia (*Marmon Holdings*)

Catalysis and Reaction Engineering I
Wednesday, March 11, 2020 (Alumni Lounge, **WeA1**)
Chair: *Malek Ibrahim* (UOP/Honeywell)
Co-Chair: *Yang Xiao* (Purdue University)
9:45 AM **Improved Catalyst Selectivity and Longevity Using Atomic Layer Deposition** (WeA1a)
Zheng Lu, Christopher L. Marshall (Argonne National Laboratory)*, Arrelaine Dameron* (Forge Nano), *Christopher P. Nicholas, Leigh M. Abrams, Paul T. Barger* (UOP/Honeywell)
10:05 AM **Site-averaged kinetics for catalysts on amorphous supports: an importance learning algorithm** (WeA1b)
Craig Vandervelden (University of California, Santa Barbara)
10:25 AM **Deciphering the hidden complexity of heterogeneous nanoparticles** (WeA1c)
Cecilia Gentle, Yuanheng Wang, Tyler N. Haddock, Conner P. Dykstra, Renske M. van der Veen (University of Illinois at Urbana-Champaign)
10:45 AM **Investigating Isobutane Dehydrogenation over Molybdenum Oxides and Sulfides** (WeA1d)
Emily Cheng, Justin Notestein (Northwestern University)
11:05 AM **Enhancing Photocatalytic Efficiency in Porous Polymers through Network Design and Post-Synthetic Strategies** (WeA1e) *Ahmet Atilgan, Mustafa M Cetin, Yassine Beldjoudi* (Northwestern University)

Industrial Crystallization I
Wednesday, March 11, 2020 (Hermann Lounge, **WeA2**)
Chair: *Meenesh Singh* (University of Illinois at Chicago)
Co-Chair: *Deepak Sharma* (Bayer)
9:45 AM **A Industrial Crystallization: Challenges and Opportunities** (WeA2a)
Nandkishor K. Nere (AbbVie)
10:05 AM **Towards Design of Synthetic Routes of Molecular Crystals and Co-crystals using Molecular Simulations and Machine Learning Approach** (WeA2b)
Santanu Chaudhuri (Argonne National Laboratory)
10:25 AM **Computer-aided-molecular design for Crystallization** (WeA2c)
Urmila Diwekar (Vishwamitra Research Institute), *Anish Dighe, Meenesh Singh* (University of Illinois at Chicago)
10:45 AM **Screening of Polymorphs and Measurement of Growth Rates of L-Histidine at Controlled Supersaturation using Continuous-Flow, Microfluidic Device** (WeA2d)
Paria Coliaie, Meenesh Singh (University of Illinois at Chicago)
11:05 AM **Micellar structures, stepwise thinning and nanoscopic thickness variations in foam films formed by aqueous sodium naphthenate solutions** (WeA2e)
Chrystian Ochoa, Vivek Sharma (University of Illinois at Chicago) *Shang Gao, Samanvaya Srivastava* (University of California at Los Angeles)

Transport Phenomena
Wednesday, March 11, 2020 (Ballroom, **WeA3**)
Chair: Joel Paustian (Honeywell UOP)
Co-Chair: *Ehsan Akbari Fakhrabadi* (University of Toledo)
9:45 AM **Pinch-off dynamics, shear and extensional rheology, and dispensing of polymer-surfactants complexes** (WeA3a)
Carina Martinez, Vivek Sharma (University of Illinois at Chicago)
10:05 AM **Flow of Biomass in a Compression Screw Feeder** (WeA3b)
Ehsan Akbari Fakhrabadi, Matthew Liberatore (University of Toledo), *Jonathan Stickel* (National Renewable Energy Laboratory)
10:25 AM **Rheology of Boger Fluids and Elastic Instabilities** (WeA3c)
Alexander Kubinski, Fahed Albreiki, Vivek Sharma (University of Illinois at Chicago), *Prerana Rathore* (University of Massachusetts at Amherst)
10:45 AM **Tuning the Solubility of Uranyl Peroxide Clusters Through Ligand Exchange** (WeA3d)
Mengyu Xu, Peter Burns (University of Notre Dame)
11:05 AM **Modelling the transport and reactions in the electrochemical reduction of dinitrogen to ammonia**

at ambient conditions (WeA3e) *Nishithan C Kani, Meenesh R Singh* (University of Illinois at Chicago)

Wednesday Afternoon Keynote Session

Wednesday, March 11, 2020 (Ballroom)

12:45 PM **Keynote Introduction**
Satish Parulekar (Illinois Institute of Technology)

12:55 PM **Molecular Engineering: A New Take on Engineering Research and Education**
Matthew Tirrell (University of Chicago)

Catalysis and Reaction Engineering II

Wednesday, March 11, 2020 (Alumni Lounge, **WeB1**)
Chair: *Satish Parulekar* (Illinois Institute of Technology)
Co-Chair: *Mengyu Xu* (University of Notre Dame)

2:00 PM **A New Catalytic Way to Make Hydrogen Upgrades Achievable** (WeB1a)
Isaac Niekamp (Johnson Matthey)

2:20 PM **Grafting metal complexes onto amorphous supports: from elementary steps to catalyst site populations via kernel regression** (WeB1b)
Salman A. Khan (University of California, Santa Barbara), Baron Peters (University of Illinois at Urbana-Champaign)

2:40 PM **Core-Shell SiO2/Nb2O5 and SiO2/TiO2 for Bronsted Acid Catalysis** (WeB1c)
Andrew Wolek, Justin M. Notestein (Northwestern University)

3:00 PM **Reactive, High-Valent Metal-Oxo Species Incorporated within Metal−Triazolate Frameworks** (WeB1d)
Andrew Rosen, Justin M. Notestein, Randall Q. Snurr (Northwestern University)

3:20 PM **The Fate of the Hole Scavenger in Plasmon-Excitation-Mediated Chemistry** (WeB1e)
Varun Mohan, Eric Wu, Jaeyoung Heo, Prashant K. Jain (University of Illinois at Urbana-Champaign)

Industrial Crystallization II

Wednesday, March 11, 2020 (Hermann Lounge, **WeB2**)
Chair: *Aditya Prajapati* (University of Illinois at Chicago)
Co-Chair: *Mudassir Rashid* (Illinois Institute of Technology)

2:00 PM **Continuous Crystallization: Case Studies in Pharma Applications** (WeB2a)
Manish S Kelkar, Moussa Boukerche, Daniel Pohlman, Nandkishor Nere (Abbvie Inc)

2:20 PM **On application to population balances in continuous crystallization** (WeB2b)
Christopher Burcham (Eli Lilly and Company)

2:40 PM **Exploring nucleation mechanism and polymorph selection in nucleation of glycine from solution** (WeB2c)
Pelin Bulutoglu, Doraiswami Ramkrishna (Purdue University)

3:00 PM **Identification of Polymorph Specific Molecular Interactions during the Process of Crystallization** (WeB2d)
Anish Dighe, Meenesh Singh (University of Illinois at Chicago)

3:20 PM **Three-dimensional supercrystals formed by controllable oversaturation: facts and artifacts.** (WeB2e) *Elena Shevchenko, Byeongdu Lee* (Argonne National Laboratory) *Mattew Pelton* (University of Maryland, Baltimore County)

Workshop Session: How to Engineer Your Success

Wednesday, March 11, 2020 (Ballroom, **WeB3**)
Chair: *Alex Flueck* (Illinois Institute of Technology)

2:00 PM **Explore the Process of Personal Transformation** (WeB3a) *Alex Flueck* (Illinois Institute of Technology)

Process Engineering and Optimization

Wednesday, March 11, 2020 (Alumni Lounge, **WeC1**)
Chair: *Ha Dinh* (UOP/Honeywell)
Co-Chair: *Norah Ghazinoor* (UOP/Honeywell)

4:00 PM **Microkinetic Model Reduction and Reactor Optimization for Oligomerization Reactor Design in CISTAR** (WeC1a)
Kanishka Ghosh, Alexander Dowling (University of Notre Dame)

4:20 PM **Personalized Medicine for In-vitro Fertilization Procedure using Modeling and Optimal Control** (WeC1b)
Apoorva Nisal (University of Illinois at Chicago) *Urmila Diwekar* (Vishwamitra Research Institute)

4:40 PM **Multi-Rate Data-Driven Models for Lactic Acid Fermentation - Parameter Identification and Prediction** (WeC1c)
Jingwei Gan, Satish J. Parulekar (Illinois Institute of Technology)

5:00 PM **Integration of Molecular Simulations and Computer-Aided Design to Enable Novel Azeotropic Separations** (WeC1d)
Bridgette Befort, Edward Maginn, Alexander Dowling (University of Notre Dame)

5:20 PM **Parametric Sensitivity and Runaway in Fixed-Bed Reactors: Example of Methanol Selective Oxidation over Pt-Bi Catalysts** (WeC1e)
Yang Xiao (Purdue University)

Biomedical Engineering

Wednesday, March 11, 2020 (Hermann Lounge, **WeC2**)
Chair: *Abhinav Bhushan* (Illinois Institute of Technology)
Co-Chair: *Curtis P Martin* (Purdue)

4:00 PM **A Novel Microfluidic Device to Study Intestine-Bacteria-Drug Metabolism** (WeC2a)

Chengyao Wang, Thao Dang, Jasmine Baste, Daniel Martin, Shanie Scole, Abhinav Bhushan (Illinois Institute of Technology)

4:20 PM **Drainage of Protein Foams and Foam Films** (WeC2b) *Lena Hassan, Chenxian Xu, Vivek Sharma* (University of Illinois at Chicago)

4:40 PM **Development of Sprayable, Thermoreversible Hydrogels for Burn Wound Applications** (WeC2c) *Riannon Smith, Nicole Brogden, Jennifer Fiegel* (University of Iowa)

5:00 PM **Lost in Translation: Engineering ribosomes with combinations of active site mutations** (WeC2d) *Alysse DeFoe, Anne E d'Aquino, Tasfia Azim, Adam J Hockenberry, Michael C Jewett* (Northwestern University), *Kim Hoang* (Johnson and Whales University)

Product and Process Characterization

Wednesday, March 11, 2020 (Ballroom, **WeC3**)
Chair: *Limin Lu* (Anton Paar)
Co-Chair: *Norbert Ponweiser* (Anton Paar)

4:00 PM **Anton Paar and Solutions in the Petroleum Industry** (WeC3a) *Shelby Voorhees* (Anton Paar)

4:30 PM **Powder Characterization: From Macroscale to Nanoscale** (WeC3b) *Mark R Haase* (Anton Paar)

5:00 PM **Rheology Testing in Polymers** (WeC3c) *Limin Lu* (Anton Paar)

YP Session: Job Search Skills

Wednesday, March 11, 2020 (Expo Room, **WeC4**)
Chair: *Ruben Barajas* (Honeywell)
Co-Chair: *Connor Wegner* (Leister Technologies)

4:00 PM **Job Searching (A Recruiter's Advice)** (WeC4a) *Adam Krueger* (Sun Recruiting, Inc.)

4:30 PM **You Big Softy! - Improving Soft Skills in the Workplace and Life** (WeC4b) *Ruben Barajas* (Honeywell)

5:00 PM **Resume Reviews** (WeC4c) *Adam Krueger* (Sun Recruiting, Inc.), *Ruben Barajas* (Honeywell), *Connor Wegner* (Leister Technologies)

Poster Session

Wednesday, March 11, 2020 (Gallery Lounge)
Chair: *Adam Kanyuh* (UOP/Honeywell)
Co-Chair: *Shahineze Saada* (UOP/Honeywell)
6:00 – 7:30 PM **Poster Session**

AIChE Midwest Regional Conference
Session Presentations
Thursday, March 12, 2020

Thursday Morning Keynote Session
Thursday, March 12, 2020 (Ballroom)
8:30 AM **Recognition for Volunteers**
Jeff Zalc (BP)
8:35 AM **Keynote Introduction**
Sohail Murad (Illinois Institute of Technology)
8:40 AM **Science & Engineering as Drivers of the Future**
Michael J. Graff (American Air Liquide)

Bio-films
Thursday, March 12, 2020 (Alumni Lounge, **ThA2**)
Chair: *Seok Hoon Hong* (Illinois Institute of Technology)
Co-Chair: *Isamar Pastrana-Otero* (University of Illinois at Urbana-Champaign)
9:45 AM **Elucidating a new extracellular function of DegP inhibiting biofilm formation of enterohemorrhagic Escherichia coli O157:H7** (ThA1a)
Kuili Fang, Seok Hoon Hong (Illinois Institute of Technology)
10:05 AM **Accurate Identification of the Differentiation Stages of Living Hematopoietic Stem and Progenitor Cells on Biomaterial Substrates using Raman Micro-Spectroscopy and Multivariate Analysis** (ThA1b)
Isamar Pastrana-Otero, Sayani Majumdar, Aidan Gilchrist, Brendan A. C. Harley, Mary L. Kraft (University of Illinois at Urbana-Champaign)
10:25 AM **Engineering colicins for target-specific control of biofilms** (ThA1c)
Xing Jin, Seok Hoon Hong (Illinois Institute of Technology)
10:45 AM **Graphene-Interface with Electrogenic Bacterial Membrane: Electron Transport and Energetics** (ThA1d)
Sheldon Cotts, Vikas Berry (University of Illinois at Chicago)
11:05 AM **Characterizing biofilm formation on carbon-foam electrodes** (ThA1e)
Jiacheng Zhou, Kuili Fang, Seok Hoon Hong (Illinois Institute of Technology), *Gregg P. Kotchey, David V. P. Sanchez* (University of Pittsburgh)

Energy and Sustainability
Thursday, March 12, 2020 (Hermann Lounge, **ThA2**)
Chair: *Lynza Sprowl* (UOP/Honeywell)
Co-Chair: *Matthew Walters* (Exponent)
9:45 AM **Carbon Dioxide Capture and Utilization: Technology Challenges and Opportunities** (ThA2a)
C. B. Panchal, Kruti Goyal, Richard Doctor (E3Tec Service, LLC)
10:05 AM **Single-atoms Synthesized via a Novel Method as the Active Site with Highly Efficient Electrocatalytic Conversion of CO2 to Ethanol** (ThA2b)
Haiping Xu (Northern Illinois University), *Di-Jia Liu* (Argonne National Laboratory)
10:25 AM **Copper (II) Oxide Nanoparticles for Electrochemical Conversion of CO2 to Value-added Chemicals in a Flow Cell** (ThA2c)
Mohammadreza Esmaeilirad, Alireza Kondori, Andres Ruiz Belmonte, Mohammad Asadi (Illinois Institute of Technology)
10:45 AM **The Recell Center: DOE's advanced battery recycling program** (ThA2d)
Bryant Polzin, Jeff Spangenberger, Linda Gaines (Argonne National Laboratory)
11:05 AM **Lead-Based composites as Anode material for Sodium-Ion Batteries** (ThA2e)
Jehee Park, Jinhyup Han, Shabbir Ahmed, Eungje Lee, Christopher Johnson (Argonne National Laboratory), *Youngsik Kim* (Ulsan National Institute of Science & Technology)

Multiphase Modeling and Simulation
Thursday, March 12, 2020 (Ballroom, **ThA3**)
Chair: Allan Issangya (Particulate Solid Research, Inc)
Co-Chair: *Reza Mostofi* (Honeywell UOP)
9:45 AM **CFD Modeling of a Bioreactor** (ThA3a)
Reza Mostofi, Azita Ahmadazdeh, Steve Poklop (Honeywell UOP)
10:05 AM **Numerical Simulation of Concentrated Solar Energy Adsorption by Packed and Fluidized Bed** (ThA3b) *Zeyuan Gao, Javad Abbasian, Hamid Arastoopour* (Illinois Institute of Technology)
10:25 AM **Performance of Fluidized Bed Strippers** (ThA3c)
Allan Issangya (Particulate Solid Research, Inc)
10:45 AM **Multiphysics Modeling of Reactors for Fuel & Chemical Production** (ThA3d)
Joel Paustian (Honeywell UOP)
11:05 AM **A Comprehensive Analysis of Transient Heat Conduction in Composite Solid Slabs Using Tailor-Made Integral Transforms** (ThA3e)
Satish J. Parulekar (Illinois Institute of Technology)

Thursday Afternoon Keynote Session
Thursday, March 12, 2020 (Ballroom)
12:45 PM **Keynote Introduction**
Ha Dinh (UOP/Honeywell)
12:55 PM ***Refining/Petrochemicals Integration – Refinery of the Future***
Keith A. Couch (Honeywell/UOP)

Refining & Petrochemical Technology
Thursday, March 12, 2020 (Alumni Lounge, **ThB1**)
Chair: *Belma Demirel* (BP)
Co-Chair: *Hadjira Iddir* (Honeywell/UOP)
2:00 PM **Intelligent Operations in Refining: Digital Technologies to Support Fuels Production** (ThB1b)
Martin R. Gonzalez (BP), *Kyle Kostroski* (BP)
2:20 PM **Honeywell Forge for Industrial- Process Reliability Advisor** (ThB1c)
Abhishek Pednekar (Honeywell)
2:40 PM **Opportunity crudes and renewable feedstocks in refining** (ThB1d)
Henrik Rasmussen (Haldor Topsoe, Inc.)
3:00 PM **Technology Advances and Commercialization of Second Generation Biofuels – 2G Ethanol** (ThB1e)
Mukund Yallambalse (Axens North America)
3:20 PM **Findings from MTO Commercialization – Don't Forget About the Small Stuff** (ThB1a)
Joe Montalbano (UOP Honeywell)

Electrochemical Engineering I
Thursday, March 12, 2020 (Hermann Lounge, **ThB2**)
Chair: *Hakim Iddir* (Argonne National Laboratory)
Co-Chair: *Alireza Kondori* (Illinois Institute of Technology)
2:00 PM **A Systematic Approach for a Mechanistic Study on Electrochemical Oxidation of Methane over Transition metals and Bi-metallic Catalysts** (ThB2a)
Aditya Prajapati, Meenesh R. Singh (University of Illinois at Chicago)
2:20 PM **Silicon in Next Generation Batteries: Stabilizing the Li-Si chemistry for Long Cycle and Calendar Life** (ThB2b)
Baris Key, Jack Vaughey, Binghong Han, Fulya Dogan, Chen Liao, Saul Lapidus (Argonne National Laboratory)
2:40 PM **Improving Li-ion batteries: A density functional theory study of electrolyte breakdown on the anode surface** (ThB2c)
Lynza Sprowl (Honeywell UOP), *Liney Arnadottir* (Oregon State University), *Maria Chan* (Argonne National Laboratory)
3:00 PM **Graphite Lithiation Under Fast Charging Conditions: Atomistic Modeling Insights** (ThB2d)
Juan Garcia, Ira Bloom, Christopher Johnson, Dennis Dees, Hakim Iddir (Argonne National Laboratory)
3:20 PM **Tri-molybdenum Phosphide (Mo 3 P) Catalyst for Electrocatalytic Hydrogen Evolution Reaction** (ThB2e)
Alireza Kondori, Mohammadreza Esmaeilirad, Mohammad Asadi (Illinois Institute of Technology)

Directed Self-assembly of Nanostructures
Thursday, March 12, 2020 (Ballroom, **ThB3**)
Chair: *Shafigh Mehraeen* (University of Illinois at Chicago)
Co-Chair: *Qian Chen* (University of Illinois at Urbana Champaign)
2:00 PM **Atomistic Modeling of Nanoparticles Lattices Formed at Surfaces and Bulks of Liquids** (ThB3a)
Petr Kral (University of Illinois at Chicago)
2:20 PM **Direct Imaging of Nanoparticle Self-Assembly in Solutions Using Liquid-Phase TEM** (ThB3b)
Qian Chen (University of Illinois at Urbana-Champaign)
2:40 PM **Impact of confinement on directed self-assembly of sub-10 nm particles into textured substrates** (ThB3c)
Shafigh Mehraeen, Zhen Luo (University of Illinois at Chicago)
3:00 PM **Active Magnetic Colloids: Multi Vortex States in Swarms of Magnetic Rollers** (ThB3d)
Alexey Snezhko (Argonne National Laboratory)
3:20 PM **Formation, Growth and Coalescence of Nanoscopic Mesas in Stratifying Foam Films** (ThB3e)
Chenxian Xu, Subinuer Yilixiati, Chrystian Ochoa, Yiran Zhang, Vivek Sharma (University of Illinois at Chicago)

Workshop Session: Job Search Essentials
Thursday, March 12, 2020 (Expo Room, **ThB4**)
Chair: *Akshar Patel* (Illinois Tech)
Co-Chair: *Krish Selvam* (Illinois Tech)
2:00 PM **Job Searching Essentials: Utilizing Technology to Strengthen Your Job Search** (***Laptops Recommended***)
(ThB4a) *Akshar Patel* (Illinois Tech)

Process and Environmental Safety
Thursday, March 12, 2020 (Alumni Lounge, **ThC1**)
Chair: *Brenton Cox* (Exponent)
Co-Chair: *Jessica M. Morris* (Exponent)
4:00 PM **Why Storage Tanks Leak and How to Stay Safe** (ThC1a) *Jessica M. Morris, Ryan J. Hart, Delmar "Trey" Morrison* (Exponent)
4:20 PM **Back to Basics: Protecting Tanks from Overpressure and Vacuum** (ThC1b)
Todd W. Drennen (BakerRisk)
4:40 PM **Flammable Liquid Spills** (ThC1c)
David C Hietala, Brenton L. Cox, Justin A. Bishop, Delmar R. "Trey" Morrison (Exponent)
5:00 PM **Stochastic optimization for real-time spatiotemporal sensor placement to monitor air pollutant through health impact assessment** (ThC1d)
Urmila Diwekar (Vishwamitra Research Institute), *Rajib Mukherjee* (University of Texas Permian Basin), *Naresh Kumar* (Electric Power Research Institute)
5:20 PM **Good Practices for the Control of Hazardous Waste Emissions** (ThC1e)
Matthew Walters, Sean Dee, Brenton Cox, Russell Ogle (Exponent)

Electrochemical Engineering II

Thursday, March 12, 2020 (Hermann Lounge, **ThC2**)
Chair: *Mohammad Asadi* (Illinois Institute of Technology)
Co-Chair: *Juan Garcia* (Argonne National Laboratory)

4:00 PM **Detecting Lithium Plating Using Raman Spectroscopy** (ThC2a) *Marco Rodrigues* (Argonne National Laboratory)

4:20 PM **The Quest for Next Generation Cathodes for Multivalent Batteries** (ThC2b)
Prakash Parajuli, Bob Jin Kwon, Ian D. Johnson, Jack Vaughey, Jordi Cabana, Robert Klie (University of Illinois at Chicago)

4:40 PM **Transition Metal Dissolution from Li(Ni,Mn,Co)O2 cathodes** (ThC2c)
Ira Bloom (Argonne National Laboratory)

5:00 PM **An investigation on ORR and OER behaviors of Lithium Oxygen battery cathode** (ThC2d)
Yang Liu, Jai Prakash (Illinois Institute of Technology)

5:20 PM **Characterization Assisted Material Design: Application of Solid-State Nuclear Magnetic Resonance on Li-ion Cathodes** (ThC2e)
Fulya Dogan (Argonne National Laboratory)

Panel Session: Big Data in Industry and Academia

Thursday, March 12, 2020 (Ballroom, **ThC3**)
Chair: *Matthew Liberatore* (University of Toledo)
Co-Chair: *Curtis P Martin* (Purdue)

4:00 PM **Introductory Remarks** (ThC3a)
Matthew Liberatore (University of Toledo)

4:05 PM **Data Management for Industry and Academia** (ThC3b)
Erica Trump (OSIsoft)

4:20 PM **Reflections on Educating Data Proficient Chemical Engineers** (ThC3c)
Curtis P Martin (Purdue)

4:35 PM **The Process Engineer as Digital Warrior** (ThC3d)
Martin R. Gonzalez (BP), *Kyle Kostroski* (BP)

4:50 PM **Interactivity Creates Big Data in the Chemical Engineering Classroom** (ThC3e)
Matthew Liberatore (University of Toledo)

5:05 PM **Panel Discussion** (ThC3f)
Matthew Liberatore (University of Toledo), *Erica Trump* (OSIsoft), *Curtis P Martin* (Purdue), *Kyle Kostroski* (BP)

Local Section Dinner and Keynote – Ticketed Event

Thursday, March 12, 2020 (Ballroom)

6:00 PM **Reception**

6:45 PM **Dinner**

7:25 PM **Local Section Announcements**
Jarad Champion (Geosyntec Consultants)

7:30 PM **Keynote Introduction**
Ha Dinh (UOP/Honeywell)

7:10 PM **EPA's Per- and Polyfluoroalkyl Substances (PFAS) Action Plan**
Edward Nam (US EPA)

AIChE Midwest Regional Conference

Conference Organizers

Conference Planning Chair

Jeffrey Zalc (BP)

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Program Chair:	*Donald Chmielewski* (Illinois Tech)
Poster Session Chair:	*Adam Kanyuh* (UOP/Honeywell)
Poster Session Co-Chair:	*Shahineze Saada* (UOP/Honeywell)

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HSO Co-Chair:	*Linh Quach* (BP)
HSO Committee:	*Akshar Patel* (Illinois Tech), *Vinika Porwall* (Illinois Tech), *Sitoshna Jatty* (Illinois Tech), *Hannah Olsen* (Illinois Tech), *Brian Winters* (Illinois Tech), *Christopher Converse* (Illinois Tech)
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Hospitality Co-Chair:	*Dongting Zhao* (BP)
YP Coordinator:	*Ruben Barajas* (Northwestern U)
Speaker Gifts	*Ogbeni Ekhomu* (bioMérieux)
Lodging and travel:	*Suzane Vieira Carneiro* (UIC)
Student Aid Coordination:	*Sitoshna Jatty* (Illinois Tech), *Aditya Parajapati* (UIC), *Connor Wegner* (Tornos Technologies)
Signage:	*Shubhadad Khanvlkar* (Illinois Tech)

AIChE Midwest Regional Conference
High School Outreach Program

This special high school program is being run in parallel with the American Institute of Chemical Engineers (AIChE) 12th Annual Midwest Regional Conference, the objective of which is to build technical relationships between industrial practitioners and governmental and academic researchers. AIChE and Illinois Tech would like to expose students to the profession of chemical engineering and engineering in general and give them the opportunity to interact with professional engineers, engineering students, and faculty. We hope you come away from this program with some idea of what chemical engineers do, how they touch your life, and whether you would like to pursue an engineering career. We encourage you to stay engaged, ask questions, and have fun!

8:45-9:45 **Engineering Expo** (Gallery Lounge)
- Meet with current engineering students and see some of their projects

9:45-11:45 Groups will split into two groups and rotate through the following activities
Engineering Lab Tours (Meet at South East Entrance to Hermann Hall)
Team Building Exercise (Expo Room)
- Work with other students to complete a hands-on engineering-related task

11:45-12:15 **Engineering Lunch** (Ballroom and Expo Room)
- Opportunity for one-on-one discussions with engineering professionals and students.

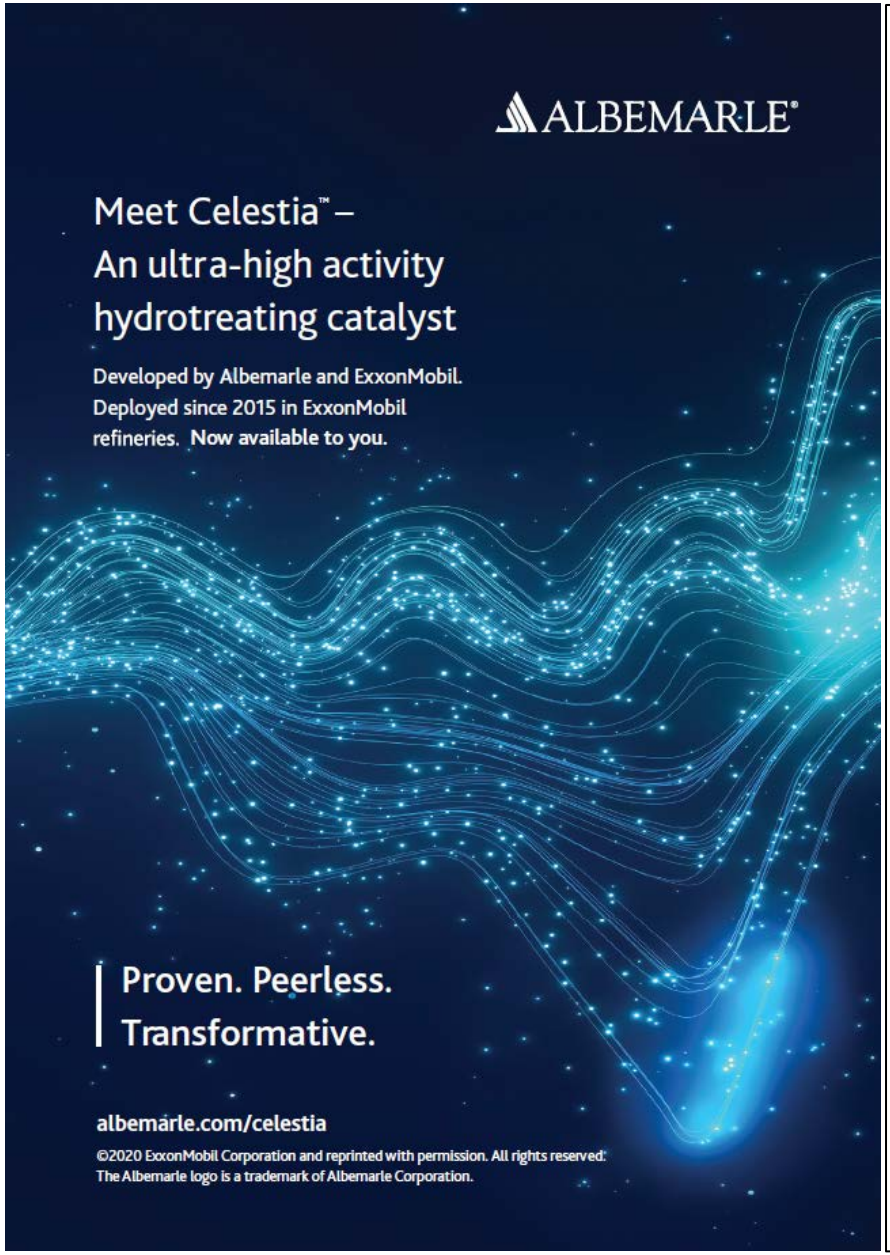
12:15-12:45 **Keynote Speaker** (Auditorium)
- Lester McCarroll, Managing Director and Client Architect, GP Ventures

12:45-1:30 **Engineering Panel Session** (Auditorium)
- Learn about the day-to-day activities of practicing engineers and engineering students. Time to ask your most burning questions.
-

Lester McCarroll, Jr has advised, guided, and served over 100 startups, early stage, and mature for-profit businesses, non-profit organizations, educational institutions, and municipalities. He has provided strategic planning, product development, business process reengineering, management and technology consulting, M&A advisory, business development, entrepreneur program development, and executive coaching for GP Ventures, Data Defenders, Digital Factory, the University of Chicago, the Village of Hazel Crest, Illinois Institute of Technology, Chicago State University, and the Chicago Urban League.

He is a managing director of the Mid South Business Association and Resource Center (MSBARC); implementing a bottom up, data driven model for economic development in Bronzeville. Lester enjoyed a 20-year career at AT&T Bell Laboratories and Motorola, where he rose to Vice President, and received Electrical Engineering degrees from the Illinois Institute of Technology in 1983 and Stanford University in 1984. Lester has led and developed programs as a member of the 100 Black Men of Chicago, the Leadership Advisory Committee of the Art Institute of Chicago, the YMCA's Achievers Program and Southside/Wabash Board, and the National Consortium for Graduate Degrees for Minorities in Engineering and Science.

HS Outreach Organizing Committee
Chair: Ellen Arnold (UOP/Honeywell)
Co-Chair: Linh Quach (BP)
Programming: Akshar Patel, Vinika Porwall, Sitoshna Jatty, Hannah Olsen, Brian Winters, Christopher Converse (Illinois Tech)



We want you for AIChE Chicago and the AIChE Midwest Regional Conference!

We need your help!

How many opportunities can you find to learn project management, delegation and leadership skills for free? Becoming an officer or volunteer-in the Chicago Section of AIChE is such an opportunity. While you're learning new skills, your local network grows. Just about all of us are either undergoing a career change, contemplating a career change, or are wondering if our career will be changed for us. Volunteering with AIChE is a way to add skills and accomplishments to your resume.

Local Section Meetings and the Midwest Regional Conference are all organized by volunteers! Please consider volunteering for the AIChE Chicago Section or next year's AIChE Midwest Regional Conference! Email us at aichechicago@gmail.com

MRC 2021

13th Annual AIChE Midwest Regional Conference

Chicago - Spring 2021

For programming and volunteer opportunities please contact the AIChE Chicago Section at aichechicago@gmail.com

AIChE Midwest Regional Conference

Young Professionals Networking Social

What: YP Social after the Midwest Regional Conference at IIT

When: 7:30 – 9:30 PM, Wednesday, March 11, 2020

Where: **Fat Fish Bar & Grill** - 234 W 31st Street, Chicago, IL 60616

Soft drinks and appetizers provided courtesy of our YP Sponsor:

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