

# AMPc

ADVANCED MANUFACTURING &  
PROCESSING CONFERENCE



June 1-3, 2022 | Hyatt Regency Bethesda | Bethesda, MD

Organized by AMPs and JAMP

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## TIPS FOR A SUCCESSFUL MEETING



Say **hello** to everyone.  
You might make someone's day.



**Introduce** yourself to people you don't know.  
They may be your next good friends.



Stop and **smile**.  
You will brighten the room considerably.



Be **understanding**.  
Everybody makes mistakes.



**Help** those with less experience.  
We were all novices at some point.



**Respect** others.  
We all have something valuable to contribute.



**Value** staff and volunteers.  
They are here for you.



Be **kind**.  
You will never like everybody, but you can be cordial to all.



**Enjoy** the meeting!  
You can have fun while sharing, learning and networking.

## CONFERENCE ORGANIZERS

### Conference Chairs

**Chrysanthos Gounaris**, *Carnegie Mellon University*

**Carla Luciani**, *Vertex Pharmaceuticals*

**Nima YazdanPanah**, *Procegence*

### Program Organizers

**Nilou Sarah Arden**, *GSK*

**Fani Boukouvala**, *Georgia Institute of Technology*

**Kyu Yong Choi**, *UMD*

**Faruque Hasan**, *Texas A&M University*

**Peter He**, *Auburn University*

**Rashed Khan**, *University of Nevada Reno*

**Richard Lakerveld**, *Hong Kong University of Science and Technology*

**Fernando Lima**, *West Virginia University*

**Haresh Malkani**, *CESMII*

**Nabil Nasr**, *Rochester Institute of Technology*

**Nese Orbey**, *University of Massachusetts Lowell*

**Ignasi Palou-Rivera**, *RAPID*

**Mike Rinker**, *PNNL*

**Steve Schmid**, *ASME*

**Victor Zavala**, *University of Wisconsin*

**Qi Zhang**, *University of Minnesota*

## WEDNESDAY, JUNE 1

### 2022 AMPc Opening & Keynote Address: Featuring Viewpoints on Advanced Manufacturing & Processing

Cabinet Suite / Judiciary Suite

9:00 AM - 10:30 AM

#### FEATURED SPEAKERS:



**Billy B. Bardin**

Global Digitalization Director  
*Dow*

#### Deriving Value from Digital and Advanced Manufacturing Technology



**Richard Braatz**

Edwin R. Gilliland Professor  
Massachusetts Institute of Technology  
(MIT)

#### New Directions in Advanced Manufacturing Systems



**David C. Miller**

Senior Fellow, Strategic Systems Analysis  
and Engineering  
U.S. Department of Energy's National  
Energy Technology Laboratory (NETL)

#### Optimizing Decarbonized Industrial and Energy Systems

## WEDNESDAY, JUNE 1

### Pharma Manufacturing Innovation Panel

Cabinet Suite / Judiciary Suite

2:00 PM - 3:30 PM

#### FEATURED PANELISTS:



**Zoltan Nagy**

Professor of Chemical Engineering Davidson  
School of Chemical Engineering  
*Purdue University*



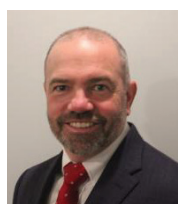
**Marty Johnson**

Executive Director-Engineering in the Synthetic  
Molecule Design and Development Department  
*Eli Lilly*



**Sharmista Chatterjee**

Division Director in Division of Process  
Assessment II  
*FDA*



**Ken Ford**

Founder & Principal Consultant  
*CMC Tech, LLC*

#### Moderated by: **Carla Luciani**, *Vertex Pharmaceuticals*

In the field of pharmaceutical manufacturing, traditional small molecules and complex biologics coexist with novel therapeutic modalities that offer extremely valuable treatments for patients. Molecular complexity of drug substances, drug product presentations, and development cycle times have significantly shifted as a result of the global COVID-19 pandemic. The major engine behind these changes is the adoption of advanced manufacturing and processing platforms. Efficiency, agility, and flexibility are the key drivers. In this session, subject matter experts from industry, academia and government will discuss major innovations, drivers, and barriers.

# FEATURED PRESENTATIONS

## WEDNESDAY, JUNE 1

### Happy Hour over Posters

Cabinet Suite / Judiciary Suite

5:30 PM - 7:00 PM

It's time to mingle with exhibitors and colleagues as we close the first day to enjoy networking and stop by a poster to hear the latest in manufacturing research.

### AMPc Banquet – Sponsored by Canvass AI

Terrace

7:15 PM - 9:00 PM

Enjoy a successful first day of the conference by partaking in our banquet reception. A catered meal presented to you as you network with other attendees, reflect on the initial panel, technical sessions and keynote presentation, gearing up for continued momentum and inspiration through the remaining two days of our conference.

sponsored by

# CANVASS

## THURSDAY, JUNE 2

### Advanced Manufacturing and Processing Roadmap and Policy Panel

Cabinet Suite / Judiciary Suite

11:00 AM - 12:30 AM

#### FEATURED PANELISTS:



#### Khershed Cooper

Program Director, Advanced Manufacturing Program, Division of Civil Mechanical & Manufacturing Innovation, Directorate for Engineering, National Science Foundation



#### Andrew Davis

Chief Technology Officer  
Industrial Base Analysis and Sustainment (IBAS)  
Program Office of Industrial Base Policy  
U.S. Department of Defense

## THURSDAY, JUNE 2



#### Michael Molnar

Director, Advanced Manufacturing National Program Office  
National Institute of Standards and Technology,  
U.S. Department of Commerce



#### Scott Smith

Acting Section Head, Precision Manufacturing and Machining  
Oak Ridge National Laboratory,  
Department of Energy

#### Moderated by: Steve Schmidt, ASME

This plenary session is focused on the Advanced Manufacturing and Processing roadmap, policy, initiatives, trends, and future outlook. Panel members from government agencies, academia, and other stakeholder will share their insights and latest development in the investments, applications, policy, and activities from their organizations. The panel presentation and discussion will be followed by a live Q&A for attendees participation as well.

FRIDAY, JUNE 3

## Sustainability and Green Manufacturing Panel

Cabinet Suite / Judiciary Suite

9:00 AM - 10:30 AM

### FEATURED PANELISTS:



#### Kate Peretti

Consortia Program Manager,  
Advanced Manufacturing Office  
*U.S. Department of Energy*



#### David S Sholl

Director, Transformational  
Decarbonization Initiative  
*Oak Ridge National Laboratory*



#### Bryan Tracy

CEO  
*Superbrewed Foods*



#### Paul Witt

Associate Director, Engineering and  
Process Science, Core R/D  
*Dow*

### Moderated by: Ignasi Palou-Rivera, *RAPID*

Green manufacturing refers to manufacturing and processing practices that use resources more efficiently (e.g., reduction in energy consumption, reduction in water usage), reduce waste generation (e.g., use of alternative raw materials, recycling, process mass intensity reduction), and/or use renewable resources. Following in last year's successful pre-conference workshop, a group of subject matter experts from industry, academia, and government will discuss vital aspects of green manufacturing such as benefits and challenges of implementation, process intensification, advances in greener processing technologies, efficient use of energy, and influences from external factors, such as government policies, corporate consciousness, and stakeholder behavior.



## WEDNESDAY, JUNE 1

7:00 AM – 5:00 PM	<b>Registration</b> Cabinet Suite / Judiciary Suite Foyer	
8:00 AM – 9:00 AM	<b>Breakfast</b> Cabinet Suite / Judiciary Suite	
9:00 AM – 10:30 AM	<b>2022 AMPc Opening &amp; Keynote Address: Featuring Viewpoints on Advanced Manufacturing &amp; Processing</b> Cabinet Suite / Judiciary Suite <b>Featured Speakers:</b> <b>Billy B. Bardin</b> , Global Digitalization Director, <i>Dow</i> <b>Richard Braatz</b> , Edwin R. Gilliland Professor, <i>Massachusetts Institute of Technology (MIT)</i> <b>David C. Miller</b> , Senior Fellow, Strategic Systems Analysis and Engineering, <i>U.S. Department of Energy's National Energy Technology Laboratory (NETL)</i>	
10:30 AM – 11:00 AM	<b>Coffee Break</b> Cabinet Suite / Judiciary Suite	
	<b>Track 1</b>	<b>Track 2</b>
11:00 AM – 12:30 PM	<b>3D Printing: Materials, Technologies, Applications</b> Susquehanna Suite/Severn Suite Nese Orbey, <i>University of Massachusetts</i> Rashed Khan, <i>UNR</i>	<b>Advanced Process Control</b> Potomac Suite/Patuxent Suite Victor Zavala, <i>Argonne National Laboratory</i> Richard Lakerveld, <i>The Hong Kong University of Science and Technology</i>
11:00 AM – 11:18 AM	<b>Macromolecular Engineering of Degradable Photocurable Resins</b> Travis Walker, <i>South Dakota School of Mines &amp; Technology</i>	<b>Optimal Control of Numbered-up Modular Chemical Facilities: Applications, Concepts, and Case Studies</b> Andrew Allman, <i>University of Michigan</i>
11:18 AM – 11:36 AM	<b>Syringe Printable Polymer Nanoparticle Composite Inks</b> Rebecca L. Fedderwitz, <i>University of Maryland</i>	<b>Toward Fully Integrated Design and Predictive Control of Complex Systems Under Uncertainty Using Multi-Fidelity Optimization</b> Joel Paulson, <i>The Ohio State University</i>
11:36 AM – 11:54 AM	<b>3D Printed Chemical Reactors for a Reduced Carbon Footprint in Process Technology</b> Christoph Kiener, <i>Siemens DI Software</i>	<b>Dynamic Operability for Model Predictive Control of Advanced Manufacturing Systems</b> Fernando V. Lima, <i>West Virginia University</i>
11:54 AM – 12:12 PM	<b>CFD Modelling of Particles Collision in Schwarz P Geometry for Wastewater Disinfection</b> Leonardo Gadelha Tumajan Costa de Melo, <i>University of Guelph</i>	<b>Reinforcement Learning-Based PID Auto-Tuning with Stability Preservation</b> Qiugang Lu, <i>Texas Tech University</i>
12:12 PM – 12:30 PM	<b>3D Synthetic Brain: Challenges and Opportunities Harnessing 3D Printing</b> M. Rashed Khan, <i>University of Nevada</i>	<b>Adaptive Control Using Reinforcement Learning Augmented Model Predictive Control</b> Debangsu Bhattacharyya, <i>West Virginia University</i>
12:30 PM – 2:00 PM	<b>AMPc Wednesday Luncheon Keynote: Strategy for Resilient Manufacturing Ecosystems through Artificial Intelligence (AI)</b> <b>Jim Davis</b> , Professor Chemical & Biomolecular Engineering, <i>UCLA</i>	



## WEDNESDAY, JUNE 1

2:00 PM – 3:30 PM	<b>Pharma Manufacturing Innovation Panel</b> Cabinet Suite / Judiciary Suite <b>Featured Panelists:</b> <b>Zolton Nagy</b> , Davidson School of Chemical Engineering, <i>Purdue University</i> <b>Ken Ford</b> , Founder & Principal Consultant, <i>CMC Tech</i> <b>Sharmista Chatterjee</b> , Division Director in Division of Process Assessment II, <i>FDA</i> <b>Marty Johnson</b> , Executive Director-Engineering in the Synthetic Molecule Design and Development Department, <i>Eli Lilly</i> <b>Moderated by:</b> <b>Carla Luciani</b> , <i>Vertex Pharmaceuticals</i>	
3:30 PM – 4:00 PM	<b>Coffee Break</b> Cabinet Suite / Judiciary Suite	
4:00 PM – 5:30 PM	<b>Data-Driven Modeling and Machine Learning</b> Susquehanna Suite/Severn Suite Fani Boukouvala, <i>Texas A&amp;M University</i> Qi Zhang, <i>University of Minnesota</i>	<b>Technologies for Next Generation Pharmaceutical Manufacturing</b> Potomac Suite/Patuxent Suite Nima Yazdanpanah, <i>Procegen</i> Carla Luciani, <i>Vertex Pharmaceuticals</i>
	<b>Track 1</b>	<b>Track 2</b>
4:00 PM – 4:18 PM	<b>Machine Learning Surrogates with OMLT and Idas for Improved Design and Analysis of Energy Systems</b> Carl D. Laird, <i>Carnegie Mellon University</i>	<b>AI-Based Image Analysis for Online Crystallization Process Monitoring</b> Hossein Salami, <i>Analytical R&amp;D, Merck &amp; Co.</i> Martha Grover, <i>Georgia Institute of Technology</i>
4:18 PM – 4:36 PM	<b>Data-Driven Modeling of Complex Nonlinear Systems Using Hybrid Series and Parallel Nonlinear Static-Nonlinear Dynamic Neural Networks</b> Angan Mukherjee, <i>West Virginia University</i>	<b>Continuous Manufacturing and PAT Implementation for the Manufacturing of a Long-Acting Oral (LAO) Dosage Form</b> Kenneth Ford, <i>CMC Tech, LLC</i>
4:36 PM – 4:54 PM	<b>Computations and Optimization for Catalysts Under Dynamic Operation</b> Georgios Psarellis, <i>Johns Hopkins University</i>	<b>A Modular High-Volume Manufacturing Platform for Fine Chemicals Via Lithium-Halogen Exchange and Electrophilic Substitution</b> Kevin Nagy, <i>Snapdragon Chemistry</i>
4:54 PM – 5:12 PM	<b>Self-Driving Labs in Chemical Science &amp; Engineering: Accelerated Discovery and Manufacturing of Energy Materials</b> Milad Abolhasani, <i>North Carolina State University</i>	<b>Paradigms in Agile &amp; Automated Operations for the Consumer Packaged Goods Industry</b> Ravindra Aglave, <i>Siemens DI Software</i>
5:12 PM – 5:30 PM	<b>Automating Parameter Estimation of Dynamic Systems Via Hybrid Modeling</b> Fani Boukouvala, <i>Georgia Institute of Technology</i>	<b>Towards an Autonomous Datafactory for Small-Scale Crystallisation of Active Pharmaceutical Ingredients</b> Chantal Mustoe, <i>EPSRC Future Research Hub for Continuous Manufacturing and Advanced Crystallisation, University of Strathclyde</i>
5:30 PM – 7:00 PM	<b>Happy Hour over Posters</b> Cabinet Suite / Judiciary Suite	
7:15 PM – 9:30 PM	<b>AMPc Banquet Sponsored by Canvass AI</b> Terrace	

## THURSDAY, JUNE 2

7:00 AM – 5:00 PM	<b>Registration</b> Cabinet Suite / Judiciary Suite Foyer	
8:00 AM – 9:00 AM	<b>Breakfast</b> Cabinet Suite / Judiciary Suite	
	<b>Track 1</b>	<b>Track 2</b>
9:00 AM - 10:30 AM	<b>Enterprise-Wide Optimization</b> Susquehanna Suite/Severn Suite Qi Zhang, <i>University of Minnesota</i> Chrysanthos Gounaris, <i>Carnegie Mellon University</i> Richard Lakerveld, <i>The Hong Kong University of Science and Technology</i>	<b>Process Intensification: Fundamentals and Applications</b> Potomac Suite/Patuxent Suite M M Faruque Hasan, <i>Texas A&amp;M University</i> Ignasi Palou Rivera, <i>RAPID</i>
9:00 AM - 9:18 AM	<b>Enterprise-Wide Optimization in the Industrial Gas Value Chain</b> Jose M. Pinto, <i>Linde</i>	<b>Modular Process Intensification Synthesis of Membrane-Based Reactive Separation Systems for Sustainable Hydrogen Production</b> Yuhe Tian, <i>West Virginia University</i>
9:18 AM - 9:36 AM	<b>Scalable Timing-Aware Network Design</b> Cristiana Lara, <i>Amazon</i>	<b>Process Intensification: Challenges and Opportunities</b> Paul Witt, <i>Dow</i>
9:36 AM - 9:54 AM	<b>A framework for Incorporating Strategic Asset and Product Decisions in Integrated Planning and Scheduling</b> Salih Emre Demirel, <i>Dow</i>	<b>Advanced Technologies for Expanding the Applicability of Reactive Distillation through Process Intensification</b> Isabel Pazmiño-Mayorga, <i>University of Manchester</i>
9:54 AM - 10:12 AM	<b>Spatially Explicit Optimization of Large-Scale Distributed Energy Systems: Application to Bioenergy with Carbon Capture and Storage</b> Eric O'Neill, <i>Princeton University</i>	<b>Novel Thermal Technologies for Enhanced Air- and Process-Side Performance of CPI-Relevant Heat Exchangers</b> Arne Pearlstein, <i>University of Illinois</i>
10:12 AM – 10:30 AM	<b>Coordinated Demand Response in Multi-Stakeholder Process Networks</b> Qi Zhang, <i>University of Minnesota</i>	<b>A 2D Membrane-Less Phase Separation &amp; Extraction Device-Part I: Implementation of Process Intensification Tools in Development</b> Matthew Coblyn, <i>Oregon State University</i>
		<b>A 2D Membrane-Less Phase Separation &amp; Extraction Device-Part II: Advanced Coatings for Enhanced Separation Efficiency</b> Lei Li, <i>University of Pittsburgh</i>
10:30 AM – 11:00 AM	<b>Coffee Break</b> Cabinet Suite / Judiciary Suite	

## THURSDAY, JUNE 2

11:00 AM – 12:30 PM	<b>AMP Policy and Roadmapping Panel</b> Cabinet Suite / Judiciary Suite <b>Featured Panelists:</b> <b>Khershed Cooper</b> , Program Director Advanced Manufacturing Program Division of Civil, Mechanical & Manufacturing, <i>NSF</i> <b>Andrew Davis, CTO</b> , (IBAS) Program Office of Industrial Base Policy, <i>US Dept. of Defense</i> <b>Michael Molnar</b> , Director – Advanced Manufacturing National Program Office, <i>US Dept. of Commerce</i> <b>Scott Smith</b> , Acting Section Head, Precision Manufacturing and Machining, <i>Oak Ridge Natl. Laboratory</i> <b>Moderated by: Steve Schmid, ASME</b>		
12:30 PM – 2:00 PM	<b>AMPc Thursday Luncheon Keynote: Digital Transformation and Cybersecurity for Process Manufacturing</b> <b>Berardino Baratta</b> , Vice President, <i>Projects &amp; Engineering, MxD</i>		
2:00 PM – 3:30 PM	<b>Workshop: Optimal Process Intensification using SPICE: A Tool for Systematic Process Design and Discovery</b> Cabinet Suite/Judiciary Suite M M Faruque Hasan, <i>Texas A&amp;M University</i>	<b>Workshop: Introduction to the IDAES PSE Framework</b> Susquehanna Suite/Severn Suite John Eslick, Radhakrishna Tumbalam Gooty and Miguel Zamarripa, <i>National Energy Technology Laboratory</i>	<b>Workshop: Additive Manufacturing- Principles and Recent Advances</b> Potomac Suite/Patuxent Suite Amy Peterson, <i>UMass Lowell</i>
3:30 PM – 4:00 PM	<b>Coffee Break</b> Cabinet Suite / Judiciary Suite		
4:00 PM – 5:30 PM	<b>Workshop Continued: Optimal Process Intensification using SPICE: A Tool for Systematic Process Design and Discovery</b> Cabinet Suite/Judiciary Suite M M Faruque Hasan, <i>Texas A&amp;M University</i>	<b>Workshop Continued: Introduction to the IDAES PSE Framework</b> Susquehanna Suite/Severn Suite John Eslick, Radhakrishna Tumbalam Gooty and Miguel Zamarripa, <i>National Energy Technology Laboratory</i>	<b>Workshop Continued: Additive Manufacturing- Principles and Recent Advances</b> Potomac Suite/Patuxent Suite Amy Peterson, <i>UMass Lowell</i>

FRIDAY, JUNE 3		
7:00 AM – 12:30 PM	<b>Registration</b> Cabinet Suite / Judiciary Suite Foyer	
8:00 AM – 9:00 AM	<b>Breakfast</b> Cabinet Suite / Judiciary Suite	
9:00 AM – 10:30 AM	<b>Green Manufacturing &amp; Sustainability Panel</b> Cabinet Suite / Judiciary Suite <b>Featured Panelists:</b> <b>Kate Peretti</b> , Program Manager for R&D Consortia, Advanced Manufacturing Office (AMO), <i>U.S. Department of Energy</i> <b>David S. Sholl</b> , Director, Transformational Decarbonization Initiative, <i>Oak Ridge National Laboratory</i> <b>Bryan Tracy</b> , Co-Founder and CEO, <i>Super Brewed Foods</i> <b>Paul Witt</b> , Associate Director, Core Research and Development, <i>Dow</i> <b>Moderated by: Ignasi Palou Rivera, RAPID</b>	
10:30 AM – 11:00 AM	<b>Coffee Break</b> Cabinet Suite / Judiciary Suite	
	<b>Track 1</b>	<b>Track 2</b>
11:00 AM – 12:30 PM	<b>Advanced Materials (Nano, Composites, Bio)</b> Susquehanna Suite/Severn Suite Kyu Choi, <i>University of Maryland</i> Rashed Khan, <i>UNR</i> Nilou Sarah Arden, <i>GSK</i>	<b>Smart Sensors, IIoT, Process Automations</b> Potomac Suite/Patuxent Suite Richard Lakerveld, <i>The Hong Kong University of Science and Technology</i> Haresh Malkani, <i>CESMII</i>
11:00 AM – 11:18 AM	<b>Machine Learning–Enabled Design of All-Natural Plastic Substitutes</b> Tianle Chen, <i>University of Maryland</i>	<b>An Interactive Causality Machine Learning System for Improving Manufacturing Energy Productivity and Preventative Maintenance</b> Yutian Ren, <i>University of California</i>
11:18 AM – 11:36 AM	<b>Two-Dimensional Zeolites: Advanced Synthesis and Catalysis Applications</b> Dongxia Liu, <i>University of Maryland</i>	<b>Towards Smart Downstream Processing of Monoclonal Antibodies</b> Todd Przybycien, <i>Rensselaer Polytechnic Institute</i>
11:36 AM – 11:54 PM	<b>Conductive Artificial Kidneys for Sensing and Fluidics Applications</b> M. Rashed Khan, <i>University of Nevada</i>	<b>How Batteryless Wireless Sensors can unlock the True Potential of Industrial IoT</b> Keal Harter, <i>Everactive</i>
11:54 PM – 12:12 PM	<b>High-Entropy Nanomaterials: Novel Synthesis and Emerging Applications</b> Qi Dong, <i>University of Maryland</i>	<b>Physics-Inspired Inferential Sensor for Tool Wear Classification in Milling</b> Utsav Awasthi, <i>University of Connecticut</i>
12:12 PM – 12:30 PM	<b>Continuous Liquid-Liquid Platform for Magnetic Particle Focusing, Enrichment and Splitting</b> E. A. Lopez-Guajardo, <i>Tecnologico de Monterrey</i>	<b>Multimodal Sensor Fusion for Smart Manufacturing</b> Satish Bukkapatnam, <i>Texas A&amp;M University</i>
12:30 PM – 2:00 PM	<b>AMPc Friday Luncheon Keynote: Impacting Energy Productivity through Smart Manufacturing</b> Haresh Malkani, CTO, <i>CESMII – The Smart Manufacturing Institute</i>	

## FRIDAY, JUNE 3

	Track 1	Track 2
2:00 PM – 3:30 PM	<b>Big Data and Data Analytics</b> Susquehanna Suite/Severn Suite Q. Peter He, <i>Auburn University</i> Fani Boukouvala, <i>Texas A&amp;M University</i>	<b>Augmented Reality and Virtual Reality</b> Potomac Suite/Patuxent Suite Fernando V. Lima, <i>West Virginia University</i> Victor M. Zavala, <i>University of Wisconsin-Madison</i>
2:00 PM – 2:18 PM	<b>Informatics Methodologies for the Development of Polymer-Based Organic Semiconductor Technologies</b> Martha Grover, <i>Georgia Institute of Technology</i>	<b>Computer Vision Aided Process Control: Methods for Enhanced Autonomy and Robustness</b> Joshua Pulsipher, <i>Carnegie Mellon University</i>
2:18 PM – 2:36 PM	<b>Process Prediction, Detection and Diagnosis Using Deep Recurrent Neural Networks on Plant Data</b> Lucky E. Yerimah, <i>Rensselaer Polytechnic Institute</i>	<b>Science-Informed Virtual Digital Twin for an Integrated Energy System with Carbon Capture: Research, Training, and Education</b> Stephen Zitney, <i>National Energy Technology Laboratory</i>
2:36 PM – 2:54 PM	<b>Pyomo.Doe: Model-Based Design of Experiments in Pyomo</b> Jialu Wang, <i>University of Notre Dame</i>	<b>Accelerate Your Digital Transformation Journey with a Connected Workforce</b> Chris Kuntz, <i>Augmentir</i>
2:54 PM – 3:12 PM	<b>Data Analysis Using Riemannian Geometry and Applications to Chemical Engineering</b> Alexander Smith, <i>University of Wisconsin</i>	<b>How Extended Reality Can Support the Plant Lifecycle, from Design to Operations</b> Ujjal Basu, <i>AVEVA</i>
3:12 PM – 3:30 PM	<b>Using Industrial AI for Energy Optimization in a Chemical Plant</b> Maddy Hawkins, <i>Canvass AI</i>	<b>AR/VR: Intentional Design Studio (IDeaS)</b> Robert E. Dempski, <i>Worcester Polytechnic Institute</i>

## **AIChE® VOLUNTEER + MEETING ATTENDEE CONDUCT GUIDELINES**

AIChE's volunteers are the core of the Institute and make all of its programs, conferences and educational efforts possible. These offerings provide excellent opportunities for AIChE members and meeting attendees to gain greater technical expertise, grow their networks, and enhance their careers. AIChE events provide engineers, scientists, and students a platform to present, discuss, publish and exhibit their discoveries and technical advances.

At all times, volunteers and meeting attendees should act in accordance with AIChE's Code of Ethics, upholding and advancing the integrity, honor and dignity of the chemical engineering profession. AIChE's Board of Directors has developed these guidelines to foster a positive environment of trust, respect, open communications, and ethical behavior. These guidelines apply to meetings, conferences, workshops, courses and other events organized by AIChE or any of its entities and also to volunteers who conduct other business and affairs on behalf of AIChE.

### **SPECIFICALLY:**

1. Volunteers and meeting attendees should understand and support AIChE's Code of Ethics.
2. Volunteers and meeting attendees should contribute to a collegial, inclusive, positive and respectful environment for fellow volunteers and attendees, and other stakeholders, including AIChE staff.
3. Volunteers and meeting attendees should avoid making inappropriate statements or taking inappropriate action based on race, gender, age, religion, ethnicity, nationality, sexual orientation, gender expression, gender identity, marital status, political affiliation, presence of disabilities, or educational background. We should show consistent respect for colleagues, regardless of discipline, employment status, and organizations for which they work, whether industry, academia, or government.
4. Disruptive, harassing or other inappropriate statements or behavior toward other volunteers, members, and other stakeholders, including AIChE staff, is unacceptable.
5. Volunteers and meeting attendees should obey all applicable laws and regulations of the relevant governmental authorities while volunteering or attending meetings. Volunteers and meeting attendees taking part in any AIChE event, including the Chem-E-Car Competition®, should also comply with all applicable safety guidelines.

Any violations of the foregoing should be reported to the President or the Executive Director of the Institute.



## A NOTE ON PHOTOGRAPHY AND VIDEOGRAPHY FROM THE MEETING ORGANIZERS



### Recording & Photography Policy

AIChE Meetings are one of the primary ways the Institute fulfills its mission to advance the development and exchange of relevant knowledge. The content presented at this event is the property of the presenters and the firms where they work. **Recording of sessions or taking photos of slides is strictly prohibited.**



### General Photography Notice

Sessions and events at the meeting are being photographed by a professional photographer. These photos will be used to illustrate articles in CEP Chemical Engineering Progress® Magazine, on the AIChE website and in promotional materials for future Meetings. By registering for this conference, you consent to your likeness being used for such purposes without compensation and release AIChE from any liability on account of such usage.

## SAFETY TIPS

Enhance your experience at the AIChE Meeting by staying safe.  
Here are some safety tips to observe:



- When off the hotel grounds, please do not wear your badge in public. Doing so can give professional opportunists access to your name, which they may then exploit to your detriment.
- When you are through with your badge, turn it in to registration. Do not leave it laying in the open so that unscrupulous individuals have access to it. In addition, please do not let anyone have access to your badge for any purpose. Lending badges to others for access to the meeting is strictly prohibited.
- Have your room key out and ready when entering your hotel room. Fumbling in an attempt to locate it in either a pocket or purse outside your door could be a security risk.
- Never give a stranger your room number.
- Upon check-in to your room, note where the nearest fire exits are, so you know in which direction to go quickly in case of a fire emergency. Remember – smoke rises, so if necessary, while exiting, get as close to the floor as possible when there is heavy smoke present.
- When out in an urban area, it is advisable to travel in groups or pairs.
- Looking down and concentrating on a mobile device while texting or listening to music through earbuds can be a hazardous activity. Doing so while you are attempting to cross a street, get on or off an escalator, walk in a crowd, or make your way through an exhibit area can all be harmful to your safety and the safety of others. Recently, there have been many incidents of distracted meeting attendees who have attempted to walk up the down escalators or walk down the up escalators in our meeting venues.
- Please take advantage of the ample seating provided in our meeting facilities in order to use your mobile device(s) in a calm setting, so that you have a safe, enjoyable experience at AIChE meetings.
- Avoid excessive consumption of alcohol. Alcohol reduces inhibitions and impairs the capacity to reason – a perfect formula to make you a target for unscrupulous behavior.

This security advisory was implemented by AIChE's Executive Board of the Program Committee (EBPC) with your safety in mind. We welcome any other suggestions you may have to help attendees have a safe and pleasant experience at our meetings.



## NOTES



## NOTES

# THE JOURNAL OF ADVANCED MANUFACTURING AND PROCESSING



The official journal of AMPs, the *Journal of Advanced Manufacturing and Processing (JAMP)* is a peer-reviewed, online journal focused on cutting-edge, new manufacturing techniques and technologies that reduce costs, save energy, and create solutions that address societal needs.

## TOPICS COVERED:

### Chemical Manufacturing and Processing

- Process intensification
- Process systems engineering (including process optimization and control)
- Modeling and simulation
- Batch-to-continuous processing
- Sustainable manufacturing
- Renewable chemicals and fuels
- Remanufacturing and recycling systems

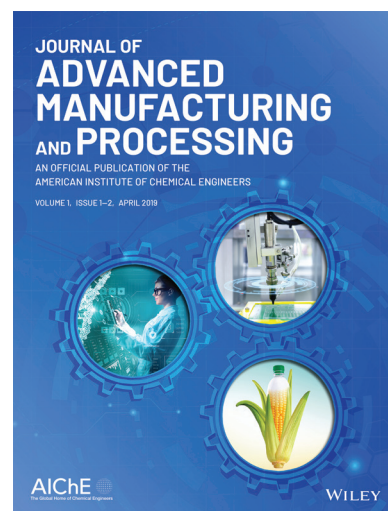
### Smart Manufacturing

- Sensors and sensing technology
- Automation and control
- Additive manufacturing

- Nanofabrication
- Energy productivity
- Modularization
- Artificial Intelligence

### Biological and Biochemical Manufacturing

- Biomanufacturing
- Biopharmaceutical processing
- Cell manufacturing and cell therapies
- Gene therapies
- Tissue engineering, manufacturing, and printing
- Tissues-on-a-chip
- Vaccine manufacturing



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