

# **COVID-19 and Beyond: Managing the Unexpected**

Held at the 2021 AIChE Annual Meeting

Boston, Massachusetts, USA and Online  
7 - 11 November and 15 - 19 November 2021

ISBN: 978-1-7138-5684-9

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2021) by AIChE  
All rights reserved.

Printed with permission by Curran Associates, Inc. (2022)

For permission requests, please contact AIChE  
at the address below.

AIChE  
120 Wall Street, FL 23  
New York, NY 10005-4020

Phone: (800) 242-4363  
Fax: (203) 775-5177

[www.aiche.org](http://www.aiche.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

## TABLE OF CONTENTS

Teaching Process Calculations to Undergraduate Chemical Engineers: An Engaged & Energized Online Class .....	1
<i>Preeti Aghalayam, Kartic Vaidyanathan</i>	
From MOOCs to Residential Instruction — Departmental Perspective on Digital Learning @ MIT ChE.....	4
<i>Zongyu Gu, Martin Z. Bazant</i>	
Virtual Implementation of a Hands-On Learning Tool and Its Effect on Student Comprehension and Motivational Gains .....	5
<i>Kitana Kaiphanliam, Olivia Reynolds, Aminul Islam Khan, Olufunso Oje, David B. Thiessen, Prashanta Dutta, Olusola Adesope, Jacqueline Burgher Gartner, Bernard Van Wie</i>	
Developing Simulation-Based, Student-Centred Educational Software in Process-Control Education and Training .....	6
<i>Niall English</i>	
Reinventing Unit Operations Laboratories Post-COVID-19 .....	7
<i>Samira Azarin, Christopher Barr, Janie Brennan, Tracy Carter, Amy J. Karlsson, Sarah Wilson</i>	
Replacing Exams with Projects: Advantages and Disadvantages as Observed During Hybrid and Remote Learning and Broader Efforts Towards Equitable Assessment.....	8
<i>Lucas Landherr</i>	
Lessons Learned During the COVID-19 Pandemic: A Literature Synthesis.....	9
<i>Deja Preusser, Milo Koretsky</i>	
Interventions to Mitigate Loss of Community During COVID-19.....	10
<i>Christi Patton Luks</i>	
Oral Exams in Undergraduate Cheme Thermo Taught Online.....	12
<i>Gennady Gor</i>	
Online Cheating: A Darker Side of Educational Technology .....	13
<i>Javier Huayta, Zachary S. Campbell, Matthew Cooper</i>	
Aiche Education Division Virtual Communities of Practice (VCPs): Updates from the 2020-2021 Academic Year .....	14
<i>Daniel Lepek, Matthew Liberatore</i>	
Modeling the Progression of Fibrosis with Dysregulation of ACE2 in COVID19 Patients.....	15
<i>Mohammad Aminul Islam, Ashlee Ford Versypt</i>	
DNA-Directed Patterning to Validate a Liposome Model of Sars-Cov-2 .....	16
<i>Molly Kozminsky, Thomas R. Carey, Lydia L. Sohn</i>	
Polymersomes Decorated with Sars-Cov-2 Spike Protein Receptor Binding Domain Elicit Robust Humoral and Cellular Immunity.....	19
<i>Lisa Volpatti, Rachel Wallace, Shijie Cao, Michal Raczy, Ruyi Wang, Melody Swartz, Jeffrey A. Hubbell</i>	

Inhalation Delivery of RNA-Loaded Lipid Nanoparticles Against Sars-Cov-2.....	20
<i>Kai Slaughter, Daniela Isaacs-Bernal, Ursula Nosi, Eric Donders, Chang Xue, Timothy Cheung, Tekeleselassie Woldemariam, Darryl Falzarano, Amy Wong, Brian Cox, Molly S. Shoichet</i>	
A Human Pluripotent Stem Cell Approach to COVID-19 (Invited Speaker).....	23
<i>Joyce Chen</i>	
Application of Biophysical and Chemical Engineering Principles for Understanding Molecular Scale Interactions Critical to Virus Entry and Infection of Its Host (Invited Speaker) .....	24
<i>Susan Daniel</i>	
Commercialization of Aptamer-Based Electrochemical Sensors .....	25
<i>Edgar D. Goluch</i>	
(Invited Talk) Developing Nanosensor Technology to Detect Cancer in Patients .....	26
<i>Daniel Heller, Zvi Yaari</i>	
(Invited Talk) Wearable Health Sensors.....	27
<i>Chelsea Monty-Bromer</i>	
Resilience in the Face of COVID-19: Managing a User Program at the Molecular Foundry .....	28
<i>Shannon Ciston</i>	
Global Supply Chain Optimization for COVID-19 Vaccines Under Covax Facility .....	32
<i>Apoorva Katragadda, Xiaonan Wang, Iftekhar Karimi</i>	
Sustainability and Resiliency Assessment for Industrial Synergies Between Renewable Energy and Chemical Production .....	34
<i>Apoorva Bademi, William Farlessyost, Miriam Stevens, Shweta Singh</i>	
A Community-Level Energy Planning Model for the Dynamic Optimization of Waste-To-Gas and Waste-To-Power Anaerobic Digestion Supply Chains.....	35
<i>Irene Mas Martin, Alvina Aui, Lisa Schulte, Mark Mba Wright</i>	
Asset Integrity Management (AIM) for Hydrogen: Major Incident Risk Reduction by Integrating a Risk-Based Safety Approach.....	36
<i>Gareth Ellor</i>	
More Haste, Less Speed: Proportionate Supply Chain Risk Management for the Accelerating Hydrogen Economy.....	37
<i>Gareth Ellor</i>	
Leading and Empowering Global Teams During a Pandemic.....	38
<i>Javier Guzman</i>	
Navigating the COVID-19 Pandemic at Michigan Technological University .....	39
<i>Pradeep K. Agrawal, Jeanna Collins, Kurt A. Rickard, Tony N. Rogers</i>	
Managing Teams Effectively During a Pandemic Required – Empathy, Connection, Agility, Prioritization and Support.....	40
<i>Rajat Duggal</i>	
Lessons Learned from Field Testing a New Technology During the Pandemic .....	41
<i>Anthony Ku</i>	

**Author Index**