

Computing and Systems Technology Division

Held at the 2024 AIChE Annual Meeting

San Diego, California, USA
27-31 October 2024

ISBN: 979-8-3313-1655-6

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© (2024) by AIChE
All rights reserved.

Printed with permission by Curran Associates, Inc. (2025)

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

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
Web: www.proceedings.com

TABLE OF CONTENTS

10D: ADVANCES IN COMPUTATIONAL METHODS AND NUMERICAL ANALYSIS I

118a Profit Considerations of an Active Cyberattack Detection Strategy on Process Actuators	1
<i>Keshav K. Rangan, Helen Durand</i>	
118b Improving the Handling of Interval Bounds During Dynamic Global Optimization	3
<i>Huiyi Cao, Kamil Khan</i>	
118c Bayesian Manifold Crawling (BMAC): An Efficient Data-Driven Algorithm for Automated Discovery of Phase Transitions in Molecular Dynamics Simulations of Polymer Systems	4
<i>Ting-Yeh Chen, Jacob Breese, Lisa Hall, Joel Paulson</i>	
118d Numerical Methods for Simulating Multiphase and Multicomponent Mixtures	6
<i>Pavan Inguva, Richard Braatz</i>	
118e Stability-Guaranteed Inference of Reduced-Order Models with Control of Power-to-X Processes	7
<i>Luisa Peterson, Pawan Goyal, Igor P. Duff, Ion V. Gosea, Jens Bremer, Peter Benner, Kai Sundmacher</i>	
118f Graph Theoretic Predictions of Stress Propagation in Functional Networks	10
<i>Alain Kadar, Marcos A. Reyes-Martinez, Steven Dunne, Sharon Glotzer, Christopher L. Soles, Nicholas Kotov</i>	
118g A Perspective on Learning Interpretable Control Policies: Thinking Local and Global	11
<i>Thomas Banker, Ali Mesbah</i>	
118h A Second-Order Linesearch Procedure within Newton's Method for Highly Nonlinear Steady- State Systems Simulation	13
<i>Bogdan Dorneanu, Vasileios Mappas, Vassilios S. Vassiliadis, Harvey Arellano-Garcia</i>	

ADVANCES IN MACHINE LEARNING AND INTELLIGENT SYSTEMS I

119a Integrating Chemistry Knowledge in Large Language Models Via Prompt Engineering	15
<i>Hongxuan Liu, Haoyu Yin, Zhiyao Luo, Xiaonan Wang</i>	
119c Transformer-Based Capacity Prediction for Lithium-Ion Batteries with Data Augmentation	58
<i>Gift Modekwe, Saif Al-Wahaibi, Qiugang Lu</i>	
119d The Molecular Descriptors with Actively Identified Subspaces (MolDAIS) Framework for Efficient Molecular Property Optimization and Beyond	60
<i>Farshud Sorourifar, Madhav Muthyala, Akshay Kudva, Ting-Yeh Chen, Joel Paulson</i>	
119e Integrating Hybrid-Modeling with Sparse Regression - A Two-Stage Approach for Discovering Dynamics from Data	62
<i>Suryateja Ravutla, Fani Boukouvala</i>	
119f A Symbolic-Sparse Regression Technique for Data-Driven PDE Learning and Solution Approximation in Chemical Engineering	64
<i>Benjamin Cohen, Burcu Beykal, George Bollas</i>	

119h A Novel Tunable Space-Filling Adaptive Sampling Strategy Based on Delaunay Triangulation.....	65
<i>Andrea Galeazzi, Steven Sachio, Maria M. Papathanasiou</i>	

10C: ADVANCES IN OPTIMIZATION

251a Global Optimization of Nonconvex Quadratically Constrained Programs Via Sparse Sum-of-Squares Relaxations.....	67
<i>Diogo Rodrigues, Pedro Castro</i>	
251b GPU Accelerated Approximation Algorithm for Multi-Parametric Linear Programming.....	70
<i>Hao Chen, Gonzalo Constante-Flores, Can Li</i>	
251c Domain Decomposition Preconditioners for Schur Complement Systems Arising in Structured Nonlinear Optimization Problems.....	72
<i>Laurens Lueg, Carl Laird, Lorenz Biegler</i>	
251d A Branch and Cut Solver for Mixed-Integer Semidefinite Programming: New Sparse Cutting Planes	74
<i>Hassan L. Hijazi, Smitha Gopinath</i>	
251e A Combinatorial Bender's Cuts Approach for Cost Minimization of Network Scheduling Problems with Mixed-Integer and Mixed-Integer Nonlinear Applications	76
<i>David A. L. Romero, Albert Lee, David E. B. Neira, Luis Ricardez-Sandoval</i>	
251f Hybrid Quantum Branch-and-Bound Method for Quadratic Unconstrained Binary Optimization.....	79
<i>Zedong Peng, Pedro M. Xavier, David E. B. Neira</i>	
251g Nonlinear Programming on GPUs for AI-Assisted Decision-Making and Beyond.....	81
<i>Sungho Shin</i>	

10B: ADVANCES IN PROCESS CONTROL I

194a Cyberattack Detectability-Based Screening of Optimal Control Systems.....	83
<i>Rahul Panicker, Nael El-Farra, Matthew Ellis</i>	
194b Distributed Reinforcement Learning for Nonlinear Control of Large-Scale Processes with Guaranteed Stability	85
<i>Jingshi Yao, Minghao Han, Xunyuan Yin</i>	
372m Modeling and Control of Batch Processes with Recycle.....	87
<i>Farshad Moayedi, Nikol Budisa, Aswin Chandrasekar, Michael R. Thompson, Prashant Mhaskar</i>	
194d Advancing Control Performance through Adversarially Robust Reduced Order Model Predictive Control.....	88
<i>Akhil Ahmed, Antonio Del Rio Chanona, Mehmet Mercangöz</i>	
194e Data-Driven Local Bifurcation Analysis Via Homeomorphism Learning.....	91
<i>Wentao Tang</i>	
194f Economic Optimization with Encrypted Control for Cyber-Resilient Operation of Nonlinear Processes	93
<i>Yash Kadakia, Fahim Abdullah, Aisha Alnajdi, Panagiotis Christofides</i>	

194g Approximating the Solution of Dynamic Optimization Problems Via Deep Neural Operators.....	94
<i>Ilias Mitrai, Prodromos Daoutidis</i>	
194h Infinite Horizon NMPC Via Time Transformation and Orthogonal Collocation.....	96
<i>San Dinh, Lorenz Biegler</i>	
194i Data-Driven State Observation through Kernel Canonical Correlation Method	97
<i>Moritz Woelk, Wentao Tang</i>	

10A: ADVANCES IN PROCESS DESIGN

311a Integrating Ecological Solutions with Technology for Enhanced Air Quality Control: A Spatio-Temporal Design and Operations Framework.....	99
<i>Utkarsh Shah, Bhavik Bakshi, Joel Paulson</i>	
311b Reverse Strategy for the Molecule-to-Flowsheet Design of Hen-ORC System: Screening for Novel HFO Working Fluids and Process Structures.....	102
<i>Xiaodong Hong, Xuan Dong, Zuwei Liao, Congjing Ren, Jingdai Wang, Yongrong Yang</i>	
311c Superstructure Optimization Using the Extended SFILES Representation of Flowsheets Combining Domain Knowledge, Machine Learning, and Symbolic AI.....	103
<i>Guzhong Chen, Vipul Mann, Rafiqul Gani, Venkat Venkatasubramanian</i>	
311d Biomanufacturing in Space: New Concepts and Paradigms for Process Design.....	104
<i>Brenda C. Loeza, Victor M. Zavala, Krista Ternus, Vernon McIntosh</i>	
311e Decomposition and Algorithmic Approaches for Solving Large-Scale Process Family Design Problems.....	106
<i>Georgia Stinchfield, Michael Bynum, Jean-Paul Watson, Carl Laird</i>	
311f A Node-Edge Representation for Reactor Network Synthesis	109
<i>Jianping Li, Brian Nelson, Siby J. Plathottam, Alinson S. Xavier, Chukwunwike Iloeje</i>	
311g Designing Operationally Flexible Diafiltration Membrane Systems for Critical Mineral Separations	110
<i>Jason Yao, Molly Dougher, Andrew Lee, Alexander Dowling, Chrysanthos Gounaris</i>	

10B: AI/ML MODELING, OPTIMIZATION AND CONTROL APPLICATIONS I

674a Enhancing Understanding of MPC Control Actions through Explainable AI Approaches.....	113
<i>Anurag Pathak, Abhijit Bhakte, Abhinav Garg, Rajagopalan Srinivasan</i>	
372ak A Practical Reinforcement Learning (RL)-Based Controller Design for Distillation Columns	115
<i>Amir H. Hamed, Hesam Hassanpour, Ankur Kumar, Prashant Mhaskar</i>	
674c Benchmarking Surrogate Embedding Strategies for Model Predictive Control	117
<i>Carlos E. Casas, Joshua Pulsipher, Luis Ricardez-Sandoval</i>	
674d Hybrid Gaussian Radial Basis Neural Networks (GRAB-NN): Development, Training, and Applications to Modeling Nonlinear Dynamic Noisy Chemical Processes.....	119
<i>Angan Mukherjee, Debangsu Bhattacharyya</i>	
674e Sample-Efficient High-Dimensional MPC Tuning Using Bayesian Optimization over Sparse Axis-Aligned Subspaces.....	121
<i>Akshay Kudva, Ali Mesbah, Melanie Huynh, Joel Paulson</i>	

674f Towards Continuous Manufacturing by Enhancing Real-Time Slug-Flow Crystallization Analysis Using Noninvasive Inline Imaging and Computer Vision	123
<i>Derrick Adams, Jay H. Lee, Shin H. Kim, Seongmin Heo</i>	
674g End-to-End Control Policy Learning through Implicit Differentiation with World Models.....	125
<i>Thomas Banker, Ali Mesbah</i>	
674h Machine Learning Based Controller Design for a Wastewater Treatment Plant Benchmark	128
<i>Chengyan Ye, Yu Yang</i>	
674i Accelerated Modeling of Various Chemical Processes Using Meta-Learning-Based Foundation Models: A Few-Shot Learning Approach Using Reptile	129
<i>Zihao Wang, Wenlong Wang, Zhe Wu</i>	

10D: APPLIED MATH FOR BIOLOGICAL AND BIOMEDICAL SYSTEMS

252a OptRecon – An Optimization-Based Framework for Automated Genome Scale Model Reconstruction upon Resolving Thermodynamically Infeasible Cycles	131
<i>Eric Nelson, Wheaton Schroeder, Rajib Saha, Sabyasachi Mohanty</i>	
252b Automated Single-Cell RNA Sequencing Analysis Supported by Large Language Models	132
<i>Yen-Chun Lu, Ashley J. Varghese, Rahul Nahar, Hao Chen, Kunming Shao, Xiaoping Bao, Can Li</i>	
252c Dissecting Metabolic Landscape of Alveolar Macrophage.....	133
<i>Sunayana Malla, Karuna A. Sajeewan, Bibek Acharya, Ratul Chowdhury, Rajib Saha</i>	
252d Simulating Solute Selectivity through Rat Kidney Glomeruli Using FEBio.....	134
<i>Nicholas O. Glover, Ashlee F. Versypt</i>	
252e Optimal, Individualized Drug Dosing Using Hybrid Pharmacokinetic Models and Multi-Objective Dynamic Optimization Under Uncertainty	135
<i>Francesco Rossi, Linas Mockus, Zoltan Nagy, Gintaras V. Reklaitis</i>	
252f Physics-Informed Neural Networks for Efficient Modeling and Estimation in Bi-Layered Ocular Drug Delivery Systems.....	138
<i>Congwen Lu, Eduardo A. C. Ruiz, Katelyn E. Swindle-Reilly, Ashlee N. F. Versypt, Joel Paulson</i>	
252h Modularity Analysis of Single-Cell Resolved Neural Activity Recordings: Bridging the Gap Between Molecular, Cellular, and Brain-Wide Changes in Biological Neural Networks	140
<i>Sihoon Moon, Jingting Liang, Hyun J. Lee, Ava Maalouf, Zikai Yu, Sahil Moza, Yun Zhang, Hang Lu</i>	
374i Identifying Causality and Estimating Time Delay for Non-Stationary Bivariate Time Series Using Novel Time Delay Rényi Symbolic Transfer Entropy	142
<i>Sana Khanum, Shakti Gupta, Mano Maurya, Shankar Subramaniam, Doraiswami Ramkrishna</i>	

10D: APPLIED MATH FOR ENERGY AND ENVIRONMENTAL SYSTEMS

675a Multi-Objective Optimization Model for Cropland Design Considering Profit, Biodiversity, and Ecosystem Services	143
<i>Caleb Geissler, Christos Maravelias</i>	

675b A Minimal-Parameter Model for Single-Solute Breakthrough Curves: Statistical and Predictive Inference.....	146
<i>Robert De Jaco, W. Sean McGivern, Jeffrey A. Manion, Daniel Siderius, Huong G. Nguyen, Anthony J. Kearsley</i>	
675c Distributed Decision Making in the Energy-Water Nexus: A Comparison with Centralized and Decentralized Governance.....	147
<i>Elizabeth Abraham, Marcello Di Martino, Dustin Kenefake, Efstratios Pistikopoulos</i>	
675d An Improved Closed-Circuit Reverse Osmosis (CCRO) for Water Desalination: Cyclic Dynamics and Energy Performance	149
<i>Mingheng Li</i>	
675e Carbon Capture Plant Model Identification through Simultaneous State and Parameter Estimation with Sensitivity Analysis	151
<i>Song Bo, Bernard Agyeman, Jinfeng Liu</i>	
675f Enhanced Modeling, Health Monitoring and Leak Diagnosis of Hydrogen Energy Transportation Systems	152
<i>Junyao Xie, Biao Huang, Stevan Dubljevic</i>	
675g DRW-BO: A Bayesian Framework for Parameter Estimation for Fractional Richards Equation with Applications in Precision Agriculture	154
<i>Zeyuan Song, Zheyu Jiang</i>	

10: CAST DIRECTOR'S STUDENT PRESENTATION AWARD FINALISTS (INVITED TALKS)

12a Adversarially Robust Real-Time Optimization and Control with Adaptive Gaussian Process Learning	156
<i>Akhil Ahmed, Antonio Del Rio Chanona, Mehmet Mercangöz</i>	
12b Semi-Centralized Multi-Agent RL for Irrigation Scheduling	159
<i>Bernard Agyeman, Song Bo, Jinfeng Liu</i>	
12c Creating a Universal Chemical Language: Leveraging Transformers to Enhance Molecular Descriptors for Quantitative Structure-Property Relationships	161
<i>Silabrata Pahari, Joseph Kwon</i>	
12d Thermodynamics-Informed Graph Neural Networks for Predicting Molecular and Mixture Properties.....	163
<i>Jan G. Rittig, Kobi Felton, Alexei A. Lapkin, Alexander Mitsos</i>	
12e Safe and Adaptive Strategies for Optimizing Battery Fast-Charging Protocols Via Reinforcement Learning	165
<i>Myisha A. Chowdhury, Saif Al-Wahaibi, Qiugang Lu</i>	
12f BONSAI: A Hyper-Sample-Efficient Framework for Robust Global Optimization of Expensive Function Network Systems Under Uncertainty	167
<i>Akshay Kudva, Wei-Ting Tang, Kevin Donnelly, Joel Paulson</i>	
12g Two-Stage Stochastic <i>Generalized Disjunctive Programming</i> (GDP) Model and Algorithm for Proactive Planning and Operations of Resilient Power Systems Under Disruptions	170
<i>Seolhee Cho, Ignacio Grossmann</i>	

12h PAMSO: Parametric Autotuning Multi-Timescale Optimization Algorithm.....	172
<i>Asha Ramanujam, Can Li</i>	

DATA SCIENCE AND ANALYTICS FOR PROCESS APPLICATIONS

632a Crystalformer: Integrating Transformer-Based Language Models in a Hybrid Approach to Relate Molecular Structure with Crystal Size Distribution	175
<i>Silabrata Pahari, Joseph Kwon</i>	
632b Improved State-of-Health Estimation for Batteries with Domain-Adaptive Deep Learning.....	177
<i>Gift Modekwe, Qiugang Lu</i>	
632c Determining Polymer Size from Raman Spectroscopy	179
<i>Luise Kaven, Eleni Koronaki, Johannes M. M. Faust, Ioannis G. Kevrekidis, Alexander Mitsos</i>	
632d Multivariable Run-to-Run Control for an Atomic Layer Etching Process Using a Transformer Model	181
<i>Henrik Wang, Feiyang Ou, Julius Suherman, Gerassimos Orkoulas, Panagiotis Christofides</i>	
632e Causal Discovery in Chemical Processes: Dealing with Cycles and Latent Confounders	183
<i>Harman Dewantoro, Alexander Smith, Prodromos Daoutidis</i>	
632f Automated Characterization and Monitoring of Material Shape Using Riemannian Geometry	185
<i>Alexander Smith, Steven Schilling, Prodromos Daoutidis</i>	
632g Multi-Source Transfer Learning for Accelerating Modeling of Chemical Processes	188
<i>Ming Xiao, Keerthana Vellayappan, P. S. Pravin, Krishna Gudena, Zhe Wu</i>	

DATA-DRIVEN AND HYBRID MODELING FOR DECISION MAKING

579a A Physics-Informed Deep Learning Approach to Predict Soil Water Content for Agricultural Decision-Making	189
<i>Amirsalar Bagheri, Davood B. Pourkargar</i>	
375q Contrastive Learning to Improve Pharmaceutical Knowledge Graph Quality in Machine Learning	191
<i>Adheesh Kadiresan, Naz P. Taskiran, Arijit Chakraborty, Vipul Mann, Venkat Venkatasubramanian</i>	
579c A Novel Hybrid Modeling Framework: Dynamic Estimation of Spatiotemporal Parameters in Complex Chemical Processes Governed by PDEs	192
<i>Parth Shah, Silabrata Pahari, Joseph Kwon</i>	
579d Dynamic Model Based Design of Experiments for Hybrid Modelling of Bioprocess	194
<i>Haiting Wang, Cleo Kontoravdi, Antonio Del Rio Chanona</i>	
375aa Simultaneous Optimization Via Physics Informed Neural Network Solvers with Compartment Models for Reactor Design.....	196
<i>Yubin Ryu, Sunkyu Shin, Wonbo Lee, Jonggeol Na</i>	
579f Optimizing Crashworthiness of Hexagonal Composite Rings Using Inverse Physics-Informed Neural Networks.....	197
<i>Kazi Khoda, Fadwa Eljack, Elsadig M. Ahmed</i>	

579g Hybrid Data-Driven Models with Physics-Informed Loss for Process Monitoring and Control.....	200
<i>Devavrat Thosar, Abhijit Bhakte, Arvind Rajendran, Zukui Li, Rajagopalan Srinivasan, Vinay Prasad</i>	

579h A Hybrid Deep Q-Learning/MILP Approach to Fast Online Planning and Rescheduling of Continuous Manufacturing Processes.....	203
<i>Syu-Ning Johnn, Vassilis Charitopoulos</i>	

10C: DATA-DRIVEN OPTIMIZATION

712a Efficient Local Multi-Fidelity Optimization of High-Dimensional Objective Functions Using Cost-Aware Gradient Entropy Search (CAGES).....	206
<i>Wei-Ting Tang, Joel Paulson</i>	

712b Gradient Information Bayesian Optimization for Composite Functions (GIBO-CF): Local Physics-Based Grey-Box Optimization in High Dimensions	208
<i>Joshua H. S. Ip, Georgios Makrygiorgos, Joel Paulson, Ali Mesbah</i>	

712c Physics-Informed Neural Networks with Hard Linear Equality Constraints	212
<i>Hao Chen, Gonzalo Constante-Flores, Can Li</i>	

712d Multistep Lookahead Bayesian Optimization for High Dimensional Black-Box Optimization Problems Using Reinforcement Learning	214
<i>Mujin Cheon, Calvin Tsay, Dong-Yeun Koh, Jay H. Lee</i>	

712e BO4IO: A Bayesian Optimization Approach to Inverse Optimization with Uncertainty Quantification.....	216
<i>Yen-An Lu, Wei-Shou Hu, Joel Paulson, Qi Zhang</i>	

712f Embedding Data-Driven Classifier Surrogates in Solvent Mixture Design Optimisation Problems.....	218
<i>Lifeng Zhang, Tanuj Karia, Gustavo Chaparro, Benoit Chachuat, Claire S. Adjiman</i>	

712g Removing the Human from Human-in-the-Loop Bayesian Optimization Via Multimodal Large Language Models, or There and Back Again	220
<i>Tom Savage, Ehecatl A. Del Rio Chanona</i>	

10B: DATA-DRIVEN MODELING, ESTIMATION AND OPTIMIZATION FOR CONTROL I

14a Unveiling Latent Chemical Mechanisms: Achieving Robustness in Hybrid Models through Physics-Informed Regularization for Spatiotemporal Parameter Estimation in PDEs	223
<i>Parth Shah, Silabrata Pahari, Joseph Kwon</i>	

14b Towards an Integrated Wide Approach for Sustainable Recovery.....	225
<i>Shakeel Ramjane</i>	

14c Data-Driven Distributionally Robust Control Using Optimal Transport for Gaussian Mixture Models	233
<i>Shu-Bo Yang, Sanjula Kammammettu, Zukui Li</i>	

14d Modeling Online Dynamic Processes with Fast Training Gaussian Processes.....	235
<i>Michael Fouts, Derek Slack, Fernando Lima, David S. Mebane</i>	

14e Phased LSTM-Based Model Predictive Control: Handling Asynchronous and Delayed Measurements.....	236
<i>Wanlu Wu, Ming Xiao, Guoquan Wu, Zhe Wu</i>	
14f Transfer Reinforcement Learning-Based Optimal Control of Nonlinear Systems.....	237
<i>Yujia Wang, Ming Xiao, Guoquan Wu, Zhe Wu</i>	
14g Data-Driven Development of Advanced Controllers for Complex Reaction Systems with Minimal Prior Information	238
<i>Shahdab M. Pathan, Anjana Puliyaanda, Karthik Srinivasan, Vinay Prasad</i>	
14h Efficient Economic Model Predictive Control of Water Treatment Process Using Learning-Enabled Koopman Operator	241
<i>Minghao Han, Adrian W.-K. Law, Xunyu Yan</i>	
14i Development of Steady-State and Dynamic Mass-Energy-Thermodynamics Constrained Neural Network (MET-CNN) Models for Interconnected Systems Using Noisy Transient Data	244
<i>Angan Mukherjee, Debansu Bhattacharyya</i>	

DATA-DRIVEN OPTIMIZATION

676a A Quantum-Inspired Optimization Method for Large and Complex Chemical Tensor Decomposition.....	246
<i>Huiwen Yu, Richard Braatz</i>	
676b Human-in-the-Loop Bayesian Optimization for Expert-Guided Experimental Design of Engineering Systems	248
<i>Tom Savage, Ehecattl A. Del Rio Chanona</i>	
676c Learning Parametric Valid Inequalities for Mixed-Integer Linear Optimization	251
<i>Shivi Dixit, Qi Zhang</i>	
676d Accelerating Optimization by Exploiting the Existence of Low Dimensional Manifolds.....	252
<i>Anastasia Georgiou, Eike Cramer, Logan R. Matthews, Ioannis G. Kevrekidis</i>	
676e Combining Machine Learning and Optimization for the Inverse Design of Ionic Liquids for Refrigerant Separation.....	253
<i>Ashfaq Iftakher, Ty Leonard, Faruque Hasan</i>	
676f A Bilevel Optimization Framework for Solving Active Learning Problems Using Physics Information.....	255
<i>Liqiu Dong, Marta Zagorowska, Tong Liu, Alex Durkin, Mehmet Mercangöz</i>	
676g Development of Steady-State and Dynamic Mass-Energy Constrained Neural Network Models Using Noisy Temporal Data for Dynamic Optimization of Distributed Chemical Systems.....	259
<i>Angan Mukherjee, Debansu Bhattacharyya</i>	

10: DIVISION PLENARY - AIChE CAST DIVISION

56c Automated Reaction Mechanism Constructor	261
<i>Miguel A. De Carvalho Servia, Klaus Hellgardt, King K. Hii, Dongda Zhang, Antonio Del Rio Chanona</i>	
56d Classification of Empirical Models with Profit Considerations	265
<i>Keshav K. Rangan, Helen Durand</i>	

56e Scalable Global Optimization of Gaussian Processes Using a Specialized Branch-and-Bound Algorithm	266
<i>Wei-Ting Tang, Akshay Kudva, Calvin Tsay, Joel Paulson</i>	
56f Improved Formulations for Superstructure Optimization: The Case of Carbon-Capture Columns	268
<i>Smitha Gopinath, Claire S. Adjiman</i>	
56g A Computational Topology Framework for Molecular Dynamics Data: A Case Study in Soft Gels.....	270
<i>Alexander Smith, Gavin Donley, Emanuela Del Gado, Victor M. Zavala</i>	

10A: DESIGN AND OPERATIONS UNDER UNCERTAINTY

710a An Operability-Based Approach for Integrated Process Design, Operations, and Risk Management	272
<i>Beatriz Dantas, Sahithi S. Akundi, Yuanxing Liu, Shayan Niknezhad, Austin Braniff, Faisal Khan, Efstratios Pistikopoulos, Yuhe Tian, Fernando Lima</i>	
710b Optimal Design and Operation of Resilient Power Distribution Systems	274
<i>Benjamin P. Riley, Hongxuan Liu, Prodromos Daoutidis, Qi Zhang</i>	
710c Constrained Black-Box Optimization for Stochastic Simulations with Polynomial-Chaos-Based Stochastic Kriging	275
<i>Zhifei Yuliu, Marianthi Ierapetritou</i>	
710d A New Solution Approach to Multistage Stochastic Programming Problems with Type II Endogenous Uncertainty	277
<i>Yasuhiro Shoji, Selen Cremaschi</i>	
710e Uncertainty Analysis and Optimization of a Solvent-Based Post-Combustion Carbon Capture Process Under Uncertainty	280
<i>Ilayda Akkor, Shachit Iyer, John Dowdle, Le Wang, Chrysanthos Gounaris</i>	
710f Design for Flexibility: An Adjustable Robust Optimization Approach.....	282
<i>Jnana S. Jagana, Sreekanth Rajagopalan, Satyajith Amaran, Qi Zhang</i>	
710g A Semi-Infinite Programming Approach to Address Renewable Energy Uncertainty in Energy Systems Design	283
<i>Moritz Wedemeyer, Eike Cramer, Alexander Mitsos, Manuel Dahmen</i>	

10D: ADVANCES IN COMPUTATIONAL METHODS AND NUMERICAL ANALYSIS II

578a Fast Training Physics Informed Machine Learning Models Using Gaussian Processes.....	285
<i>Michael Fouts, Fernando Lima, David S. Mebane</i>	
578b Bayesian Optimization-Aided Ground-State Molecular Calculation in Current Quantum Computers	287
<i>Farshud Sorourifar, David E. B. Neira, Joel Paulson, Norm Tubman, Diana Chamaki, Erik J. Gustafson</i>	
578c Optimization-Based Design of Process Control Law for Implementation on Quantum Computers	289
<i>Shilpa Narasimhan, Jihan A. Halloun, Kip Nieman, Helen Durand</i>	

578d Variational Inference for Semi-Parametric “Hybrid” Models.....	292
<i>Kyla Jones, Alexander Dowling, Daniele E. Schiavazzi</i>	
578f Lyapunov Neural ODE Control (L-NODEC) for Robust Policy Search in Nonlinear Systems.....	295
<i>Joshua H. S. Ip, Georgios Makrygiorgos, Ali Mesbah</i>	
578g Brownian Bridges for Stochastic Containment Using Self-Adjoint Formulation of the Backward Fokker-Planck Equation	300
<i>George Curtis, Doraiswami Ramkrishna, Vivek Narsimhan</i>	
578h Enhancing Computational Speed in the Discopde Symbolic Regression Framework Using Time-Efficient Integration Methods	301
<i>Isabella Hillman, Benjamin Cohen, George Bollas</i>	

10D: INTERACTIVE SESSION: APPLIED MATHEMATICS AND NUMERICAL ANALYSIS

374a Novel Plant Modelling Paradigm Eliminates Plant Level Nonlinearities, Incorporates Naturally Hybrid Models, and Corresponding Software Architecture	302
<i>Vladimir Mahalec, Arman Khani, Farbod Maghsoudi, Barnabas Osei</i>	
374d Optimizing Personalized Treatment Policy for Cancer Chemotherapy	304
<i>Trung V. Phan, Shengkai Li, Anastasia Georgiou, Benjamin Howe, Sarah R. Amend, Kenneth J. Pienta, Joel S. Brown, Robert A. Gatenby, Robert H. Austin, Ioannis G. Kevrekidis</i>	
374e Innovating Soft Matter Manipulation with Fibrous Nonwovens: Integrating Computational Design and Experimental Insights for Pore-Scale Electrokinetic Applications.....	305
<i>Satchit Nagpal, Zachary R. Gagnon, Joseph Kwon</i>	
374f Transcriptomics Data Integrated Rice Kernel Metabolic Model Identified Histidine as a Marker of Chalkiness	306
<i>Niaz Chowdhury, Anil Chandran, Harkamal Walia, Rajib Saha</i>	
374g Integrated Digital Design of Efficacy and Optimal Treatment of Oral Drugs	307
<i>Meng-Hua Yang, Francesco Rossi, Gintaras V. Reklaitis, Zoltan Nagy</i>	
374h Constructing 3D Voronoi Structures: A Toolkit with Biomedical Case Studies	309
<i>Lucy Todd, Matthew Chin, Marc-Olivier Coppens</i>	
374j Mathematical Analysis of Percolation Processes with Application to Epidemics and Filtration.....	310
<i>Robert Ziff</i>	
374k Towards an Integrated Wide Approach for Sustainable Upstream Field Recovery	311
<i>Shakeel Ramjane, Nilay Shah</i>	
374l Lion Software: A Roaring Transformation in Data Visualization.....	319
<i>Lucy Todd, Arthur Fordham, Marc-Olivier Coppens</i>	
374m A Fast Spectral Method for Field-Induced Behavior of Dense Electrolytes in Confined Geometries.....	320
<i>Aref Hashemi, Raul P. Pelaez</i>	
374n Novel Parametric Gradient Calculation Method for Multistage Systems with Generalized Constraints.....	321
<i>Bogdan Dorneanu, Vasileios Mappas, Vassilios S. Vassiliadis, Harvey Arellano-Garcia</i>	

374o On a Least-Squares Finite Element Method for Multicomponent Diffusion and Reaction Processes	323
<i>Tate Tsang</i>	
374p Enhancing Quantum Algorithms through Integration with Model Predictive Control Concepts	324
<i>Dominic Messina, Helen Durand, Alicia Magann, Mohan Sarovar</i>	
374q Surrogate Modeling Based on Nonconventional Adaptive Sampling on Smolyak Sparse Grids	327
<i>Michaela Bush, Mohammadreza Fakhraei, Michael Howard, Christopher Kieslich</i>	
374r Quantum-Enhanced Next-Generation Blockchain Consensus Protocol for Energy Efficiency and Climate Sustainability.....	328
<i>Kazi Khoda</i>	
374s Multiple Particle Tracking Data Analyzed with Machine Learning to Predict Complex Biological Variables.....	331
<i>Nels Schimek, Brendan Butler, Michael McKenna, David Beck, Elizabeth Nance</i>	
374t Literature-Based Discovery of Biological Concepts Associated with Diabetic Kidney Disease Using SemNet 2.0.....	334
<i>Krutika Patidar, Jennifer H. Deng, Cassie S. Mitchell, Ashlee N. F. Versypt</i>	
374u From Theoretical Models to Practical Solutions in Crystal Growth Inhibition: Role of Adaptive Kinetic Monte Carlo Simulations in Understanding Modifier Binding and Etch Pits	336
<i>Satchit Nagpal, Jeffrey Rimer, Joseph Kwon</i>	

INTERACTIVE SESSION: DATA AND INFORMATION SYSTEMS

375a Physics-Informed Estimation of Thermodynamic Parameters of Biodiesel Production from <i>Enteromorpha Compressa</i> Microalgae	338
<i>Amir Shahbazi, Burcu Beykal</i>	
375b Artificial Intelligence-Based Bacteria Species Distinction Based on Raman Microscopy.	340
<i>Sidharth Laxminarayan, Lily Cheung, Fani Boukouvala</i>	
375c Can Transfer Learning Assist in Resolving Missing Data for Enhanced Data-Driven Optimization?	341
<i>Teslim Olayiwola, Jose Romagnoli</i>	
375d A Distributed Data-Driven Predictive Modeling Approach for Cyber-Process Incident Identification Using Spectral Community Detection.....	342
<i>Amirmohammad Ebrahimi, Amirsalar Bagheri, Davood B. Pourkargar</i>	
375e Cyber-Attack Detection and Resilient Control Using Physics-Informed Machine Learning	344
<i>Guoquan Wu, Yujia Wang, Zhe Wu</i>	
375f Time Delayed Cointegration Analysis for Non-Stationary Process Monitoring	345
<i>Jingzhi Rao, Cheng Ji, Jingde Wang, Wei Sun, Jose Romagnoli</i>	
375g Fast, Accurate Process Monitoring Based on Multi-Block Mutual Information and Nonparametric Statistical Process Control	346
<i>Fangyuan Ma, Alireza Miraliakbar, Xun Tang, Zheyu Jiang, Wei Sun</i>	
375h Online Fault Detection and Diagnosis of Industrial Processes Via Data Augmentation and Integrative Learning of Process Knowledge and Fault Propagation Map	347
<i>Alireza Miraliakbar, Fangyuan Ma, Zheyu Jiang</i>	

375i Detection of Faults in Multi-Modal Plant Operation Via Latent Space Models Based on First-Principles Plant Models	348
<i>Enrique Luna, Vladimir Mahalec</i>	
375j Probabilistic Distribution Reconstruction Model for Few-Shot Fault Monitoring in Chemical Processes	350
<i>Borui Yang, Jinsong Zhao</i>	
375k Towards a Thrombosis Detection System Based on High-Frequency Central Venous Pressure Data	352
<i>Zahra Vaez, Charlie Everhart, Matthew F. Mikulski, Daniel Stromberg, Richard P. Lion, Daniel P. Howsmon</i>	
375l Harnessing the Power of LLMs to Disentangle Complex Metabolic Models and Regulatory Networks	354
<i>Stefanos Xenios, Konstantinos Mexis, Nikos Trokanas, Antonios Kokosis</i>	
375m Leveraging Knowledge Synthesis and Transfer Learning in Photo-Bioproduction for Enhanced CO ₂ Capture and Upcycling.....	356
<i>Runyu Zhao, Wenyu Li, Bin Long, Joshua Yuan, Yixin Chen, Yinjie Tang</i>	
375n Large Language Models for Discovering Equations	357
<i>Samiha Sharlin, Tyler R. Josephson</i>	
375o Modelling Local Steady-State and Time-Dependent Reactive Dynamics in Porous Media by Multiscale Neural Networks.....	358
<i>Agnese Marcato, Javier E. Santos, Daniele Marchisio, Gianluca Boccardo</i>	
375p Quantitative Evaluation of Catalyst Shape in SEM Images Using Gan and Semi-Supervised Semantic Segmentation	360
<i>Yong S. Lee, Heehyun Choi, Janggeun Lee, Jonghwan Oh, Janggeun Lee, Woochang Jeong, Jiyong Kim</i>	
375r Offline RL for Optimal Bioprocess Production Scheduling.....	362
<i>Haiting Wang, Cleo Kontoravdi, Antonio Del Rio Chanona</i>	
375s Artificial Intelligence (AI) for Oil and Gas Upstream Processes, KPIs and Potential Savings.....	363
<i>Amr Abdelghany, Ahmed Hamed, Yousef Mohassab</i>	
375t Neural Network Analysis of NMR and IR Spectra.....	364
<i>James Sturgill, Max Depperschmidt, Dakota Even, Aaron M. Scurto, Kyle Camarda</i>	
375u Time-Series Multiscale Computational Fluid Dynamics Data Modeling with Transformers for Atomic Layer Processing	365
<i>Henrik Wang, Feiyang Ou, Julius Suherman, Matthew Tom, Gerassimos Orkoulas, Panagiotis Christofides</i>	
375v Machine Learning, Modelling, and Simulation for Problem-Solving in the Hydrogen Production Process	366
<i>Oscar Martinez, Giovanni M. Medina</i>	
375w Symbolic Regression-Based Recursive Surrogate Model for a Manufacturing Process	368
<i>Seulki Han, George Bollas</i>	
375x Prediction of Mineral Scale Formation in Bakken-Using Machine Learning	370
<i>Arash Tayyebi, Ali Alshami</i>	

375y Enhancing Electrochemical Deionization Optimization through Integrated Physics and Machine Learning Models.....	371
<i>Teslim Olayiwola, Jose Romagnoli</i>	
375z Optimizing CO ₂ Utilization Efficiency through Physics-Informed Modeling of Membrane Reactors.....	372
<i>Zahir Aghayev, Zhao Feng Li, Michael Patrascu, Burcu Beykal</i>	
375aa Simultaneous Optimization Via Physics-Informed Neural Network Solvers with Compartment Models for Reactor Design.....	374
<i>Yubin Ryu, Sunkyu Shin, Wonbo Lee, Jonggeol Na</i>	
375ab Enhancing Li-Ion Battery Remaining Useful Life Prediction with a Physics-Constrained Bayesian Recurrent Neural Network	375
<i>Jiwei Yao, Tao Gao, Kody Powell</i>	
375ae Policy Development for a Mobile Robot to Search for the Source of a Chemical Plume in an Urban Environment	378
<i>Paul Morris, Cory Simon</i>	
375ag A Pre-Train and Fine-Tune Paradigm of Fault Prognosis for Chemical Process	379
<i>Yiming Bai, Jinsong Zhao</i>	
375ai Data-Driven Multi-Objective Optimization for Canister Sampling Site Selection.....	381
<i>S. M. Farhad, Tianxing Cai</i>	

10B: INTERACTIVE SESSION: SYSTEMS AND PROCESS CONTROL

372a Automation and Control of Continuous Countercurrent Tangential Chromatography	382
<i>Jie Wang, Anish Dighe, Jing Guo, Richard Braatz</i>	
372b Battery Thermal Management of Electric Vehicles through Optimal Control of Battery Cooling and Refrigerant Circuits.....	383
<i>Hyungjun Kim, Changbeom Hong, Se-Kyu Oh, Daeki Hong, Jaewoong Kim, Yeonsoo Kim</i>	
372c Adaptive Model Predictive Control for Optimal Irrigation Scheduling.....	385
<i>Jisung Jang, Di Tian, Q. Peter He</i>	
372d Explicit Machine Learning-Based Model Predictive Control of Nonlinear Processes	387
<i>Wenlong Wang, Yujia Wang, Yuhe Tian, Zhe Wu</i>	
372e Encrypted Distributed Control of Nonlinear Processes	388
<i>Yash Kadakia, Fahim Abdullah, Aisha Alnajdi, Panagiotis Christofides</i>	
372g Learning Based Real-Time Batch Tracking of Multi-Product Pipeline Systems.....	389
<i>Lu Zhang, Junyao Xie, Stevan Dubljevic</i>	
372h Understanding and Modeling Corrosion in CO ₂ Transportation Pipelines: Findings from the Carbon Adapt Project	390
<i>Tanmay Chaturvedi, Maciej Zychowski, Mohammad Ostadi, Dennis S. Hansen, Mads V. Bram, Simon Pedersen</i>	
372j Digital Integration of Fermentation and Centrifugation Processes: Optimizing Pilot-Plant Biomanufacturing for Enhanced Efficiency	392
<i>Alina A. Malanca, Mads Stevnsborg, Adem Aouichaoui, Ryan Barton, Gary Gilleskie, Carina L. Gargalo, Krist V. Gernaey</i>	

372k Development of a Black-Box Parameter Estimation Methodology of a Batch Anti-Solvent Protein Crystallisation Process with Sparse Measurements	394
<i>Daniele Pessina, Jerry Heng, Maria M. Papathanasiou</i>	
372l Accelerating Formulation Discovery Using First-Principles Hansen Solubility Parameter (HSP) and Optimization	396
<i>Ashlesha Tiple, Kara Johnson, Rakesh Gummalla, Peter Koenig, Xueying Ko</i>	
372n Development of a Curie Pendulum-Based, Non-Electrical Temperature Control for Thermal Cyclers.....	397
<i>Anil R. Soreddy, Aashish Priye</i>	
372o Optimizing Affordable Electrified Multifamily Housing: A Novel Non-Cooperative Stackelberg Game Approach for Grid Profitability and Tenant Affordability	398
<i>Matthew Williams, Ethan Gallup, Chris Parker, Blake Billings, Kody Powell</i>	
372p A Novel Bidding Methodology for Power Trading in a Local Energy Market.....	399
<i>Ioanna Kalospyrou, Timothy Hutty, Robert Milton, Solomon F. Brown</i>	
372q Multiscale Modelling of Trickle Bed Reactors for Biological Methanation.....	401
<i>Sandro Malusà, Gianluca Boccardo, Daniele Marchisio</i>	
372r Numerical Investigation into the Gasification of Industrial Organic Waste in Entrained-Bed Reactors Utilizing Detailed Chemical Kinetic Mechanisms	403
<i>Huiyang Bi, Shuyi Shen</i>	
372s Data-Driven Model for Boil-Off Gas Estimation in a Liquefied Natural Gas Regasification Terminal.....	406
<i>Shweta Nagrale, Rajagopalan Srinivasan, Iftekar Karimi</i>	
372t Data-Driven Approach to Automated Reaction Process Analysis	408
<i>Junu Kim, Itsushi Sakata, Eitaro Yamatsuta, Hirokazu Sugiyama</i>	
372u Learning a Data-Driven Reactor Model from Experimental Data of a Continuously Operated Fixed-Bed CO ₂ Methanation Reactor on Pilot-Scale.....	410
<i>Alexander Geschke, Jens Bremer, Kai Sundmacher</i>	
372v Causality-Guided Observer Model Minimization of an Acetaminophen Chemical Production Process.....	412
<i>William Farlessyost, Shweta Singh</i>	
372w Design of Experiments Based on Precise Data-Quality Assessment Using Finite-Sample Data.....	414
<i>Masanori Oshima, Sanghong Kim, Yuri Shardt, Ken-Ichiro Sotowa</i>	
372y Invertible Neural Networks as Discrete Time Process Models for Correlated Non-Gaussian Noise.....	416
<i>Eike Cramer</i>	
372z Time Series Modelling of an Industrial Desiccant Dryer.....	418
<i>Ece S. Köksal, Sida Chai, Erdal Aydın, Mehmet Mercangöz</i>	
372aa Fixed/Mobile Detector Placement Optimization and Validation System Using Differentiable Physics-Based Surrogate Models for Chemical Leak Dispersions.....	419
<i>Kangseop Kim, Dongil Shin</i>	

372ab Development of a Model Based on Deep Reinforcement Learning, LSTM Network, and TD3 Algorithm for Optimization and Control of MAb Production in Mammalian Cell Cultures	420
<i>Essa Almutar, Satish Parulekar</i>	
372ac Using Artificial Neural Networks to Predict Chemical System Stability for Design.....	422
<i>Tate Bestwick, Kyle Camarda</i>	
372ad Leveraging Large Language Models for the Identification, Annotation, and Substrate Prediction of Transporter Proteins.....	423
<i>Saman Shafaei, Huimin Zhao</i>	
372af Scheduling of State Task Network Under Uncertainty Via a Hybrid Reinforcement Learning Agent with Partial Observability	424
<i>Daniel R. Martinez, Luis Ricardez-Sandoval</i>	
372ag Variable Extraction and Equivalence Judgment with BERT Model Pre-Trained on Chemical Engineering-Related Papers	427
<i>Shota Kato, Chunpu Zhang, Kotaro Nagayama, Manabu Kano</i>	
372ah Similarity-Based Machine Learning for Small Datasets; Application in Predicting Bio-Lubricant Properties	430
<i>Jae Y. Kim, Salman A. Khan, Dionisios Vlachos</i>	
372al Pinn-Based Modular Digital Twin Development for Sustainable Electroplating Manufacturing	431
<i>Mahboubbeh Moghadasi, Yinlun Huang</i>	
372am Learning Production Planners' Unknown Objectives Via Inverse Optimization	432
<i>Shivi Dixit, Rishabh Gupta, Adam Kelloway, Kyle Harshbarger, John Wassick, Qi Zhang</i>	
631b Process Modeling and Optimal Operational Strategies for Integrated Chemical Looping Hydrogen Production and Biomass Gasification Under Feedstock Uncertainty	433
<i>Byoungyoun Lee, Juyeong Jung, Seongmin Heo</i>	

10A: POSTER SESSION: INTERACTIVE SESSION: SYSTEMS AND PROCESS DESIGN

371a Machine Learning on Prediction Hydrogen Production from Biomass and Plastic Waste Gasification	435
<i>Collette Riviere, Max Edelstein, Wei Shi, Ping Wang</i>	
371b Forcing Signal Optimization and Simultaneous Simulation Approaches Applied to Dynamic/Programmable Catalysis	436
<i>Carolina C. Tedesco, John Kitchin, Carl Laird</i>	
371c Modeling Air Separation Via Pressure-Swing Adsorption in Python for Use in Urea Production	439
<i>Kaden Hubler, Oris Correa, Kate Altman, Kyle Camarda</i>	
371d Multiscale Modeling of Atomic Layer Deposition Process for Optimal Operation: Integration of Kinetic Monte Carlo and Computational Fluid Dynamics	440
<i>Chaeun Lee, Woojin Kang, Jonggeol Na</i>	
371e Supply Chains Optimization through Hybrid Tools.....	441
<i>Jesus M. N. Lopez, Juan G. Segovia</i>	

371g Identification of Hybrid Population Balance Models for Mechanochemical Depolymerization	442
<i>Jacob Sweet, Elisavet Anglou, Fani Boukouvala</i>	
371h Sustainable Management for a Salt Lake Basin with a Water-Food-Energy-Carbon Nexus Approach with Dynamic Optimization.....	444
<i>Amira Siniscalchi, Erica P. Schulz, Guillermo Durand, Maria S. Diaz</i>	
371i Module LEVEL LCA for Analysis of SCOPE 1,2 and 3 Emissions of Chemical Plants – Implementation in Python	445
<i>Elias Martinez-Hernandez, Alan Jimenez</i>	
371j Synthesis and Global Optimization of Heat-Integrated Thermally Coupled Distillation Systems.....	446
<i>Anqing Wang, Ruixuan Ying, Hajime Ohno, Yasuhiro Fukushima</i>	
371k A Reinforcement Learning Approach with Masked Agents for Chemical Process Flowsheet Design.....	448
<i>Simone Reynoso-Donzelli, Luis Ricardez-Sandoval</i>	
371l Automatic Design and Optimization of Extractive Distillation Sequence for Multicomponent Azeotropic Systems	451
<i>Jiaqi Meng, Jiale Hou, Yachao Dong, Jian Du</i>	
371m Analysis of Decision Support System for Control Room Operators Using Cognitive Measures.....	453
<i>Anurag Pathak, Babji Srinivasan, Rajagopalan Srinivasan</i>	
371n A Novel Methodology to Assess Safety of Process Streams at the Conceptual Design Stage.....	455
<i>Silvia Pelucchi, Filippo Carretta, Paolo Mocellin, Chiara Vianello, Federico Galli</i>	
371o Integrating Multiscale Modeling and Simulation (MMS) and Machine Learning (ML) for Chemical Engineering Applications	458
<i>Seckin Karagoz</i>	
371p Computer-Aided Exploration of Cryoprotective Agents for Stem Cell Manufacturing	459
<i>Yusuke Hayashi, Rei Tamaki, Yuki Uno, Masahiro Kino-oka, Hirokazu Sugiyama</i>	
371q From Flexibility Evaluation to Economic Optimization: An Iterative Multi-Objective Framework for Process Design Under Uncertainty	460
<i>Sunwook Kim, Seongmin Heo</i>	
371r Optimization and Uncertainty Management of Wind Power Generation Using Natural Gas Hydrogen Mixture	462
<i>Saif R. Kazi, Kaarthik Sundar, Deepjyoti Deka, Russell Bent</i>	
371s Design and Operation of Carbon Capture, Utilization, and Storage (CCUS) Supply Chain Networks Under Uncertainty	463
<i>Chinmay Aras, Faruque Hasan</i>	
371t Two-Stage Chance-Constrained Programming for Refinery Optimization Under Uncertainty	464
<i>Yu Yang</i>	
371u AI-Based Decision Making of Steam Methane Reforming Operation Strategies from Fluctuated Biogas Production.....	465
<i>Janggeun Lee, Woochang Jeong, Jonghwan Oh, Heehyun Choi, Yong S. Lee, I. M. Hyeonseo, Jiyong Kim</i>	

371v Uncertainty-Conscious Model-Based Design of Human Mesenchymal Stem Cell Manufacturing Processes.....	467
<i>Hirokazu Sugiyama, Keita Hirono, Benedikt Scholz, Isuru A. Udugama, Yusuke Hayashi, Yuto Takemoto, Ryuji Kato, Masahiro Kino-Oka</i>	
371w Towards Global Robust Optimization of Non-Convex Continuous Problems: Application to Pooling Problems	468
<i>Asimina Marousi, Vassilis Charitopoulos</i>	
371x Meteorological Feasibility of a Moisture Capture System from Air Using Mixed-Integer Linear Fractional Programming.....	471
<i>Jinsu Kim, Yanhui Yuan, Ben McCool, Matthew Realff</i>	
371y A Systematic Approach for Characterizing Probabilistic Operating Space Under Hybrid Uncertainties.....	472
<i>Yao Tong, Duo Zhang, Qinyu Bao, Zhijiang Shao</i>	
371z Extrapolation Error Quantification for the Discovery of Optimal Experimental Conditions	474
<i>Jonghwan Oh, Woochang Jeong, Janggeun Lee, Heehyun Choi, Yong S. Lee, I. M. Hyeonseo, Jiyong Kim</i>	
371aa Feasibility Study and Machine Learning-Based Optimization for Shipboard CO ₂ Capture Leveraging Available Energy Sources.....	476
<i>Dat-Nguyen Vo, Xuewen Zhang, Kuniadi W. Huang, Xunyu Yuan Yin</i>	
371ab Energy and Cost Analysis of Direct Air Capture Using Laminate Structured Gas-Solid Contactors.....	478
<i>Youn J. Min, Jinsu Kim, Christopher Jones, Matthew Realff</i>	
371ad Multi-Scale Dynamic Techno-Economic Analysis of Pulsed Electrochemical CO ₂ Reduction Process.....	479
<i>Youlim Chung, Youngwon Lee, Jonggeol Na, Chan W. Lee, Kyoungsuk Jin</i>	
371af Low-Cost Resource Management Considering Life Cycle Impacts.....	481
<i>Mohammad Lamah, Dhabia Al-Mohannadi, Patrick Linke</i>	
371ag Development of a Systematic TEA Framework to Assess Emerging Designs for Electrified Chemical Processes	482
<i>Claudemi Nascimento, Beatriz Dantas, Krishna M. Busam, Fernando Lima</i>	
371ak Multistage Distributionally Robust Optimization for the Design of Hybrid Energy-Driven Multi-Network Processes Under Uncertainty.....	484
<i>Yuxuan Xu, Lifeng Zhang, Zhihong Yuan</i>	
371an Synthesis and Comparison of Carbon Dioxide Emissions Free Hydrogen Production	485
<i>Cornelius Masuku</i>	
371ao Enhancing Circular Economy through Calcium Looping: Technoeconomic and Life Cycle Insights into Repurposed Steel Slag for CO ₂ Capture	486
<i>Ahmed AlHajaj, Priyanka Kumari, Ahmed Alkatheeri, Nahla Alamoodi, Ludovic F. Dumeé</i>	
371ap Game Theory-Informed Blockchain Framework for Social Life Cycle Assessment: Enhancing Sustainability in Germanium Extraction from PV Scrap.....	487
<i>Mehzabeen Mannan, Sami Al-Ghamdi, Kazi Khoda</i>	
371aq Studies of sCO ₂ Power Cycles for Sustainability.....	490
<i>Warren Seider, Duoli Chen, John P. O'Connell</i>	

371ar Advanced Integration Strategies and Machine Learning-Based Superstructure Optimization for Power-to-Methanol	491
<i>Dat-Nguyen Vo, Meng Qi, Chang-Ha Lee, Xunyuan Yin</i>	
371as Modular Forms in Combinatorial Optimization.....	493
<i>Varsha Gupta</i>	

10C: INTERACTIVE SESSION: SYSTEMS AND PROCESS OPERATIONS

735bk A Parametric Column-and-Constraint Generation Algorithm for Robust Optimization Under Endogenous Uncertainty	494
<i>Jnana S. Jagana, Qi Zhang</i>	
373a Simulating Relief Scenarios in a Column Using Aspen Hsys.....	496
<i>Avinashkumar Karre</i>	
373b Development of Open-Source Software Tools for Data-Driven Canister Sampling Site Selection	497
<i>S. M. Farhad, Tianxing Cai</i>	
373c GDPLib: An Open Library of Generalized Disjunctive Programming Problems and Solution Method Benchmarking.....	498
<i>Carolina Tristán, Albert Lee, Zedong Peng, David E. B. Neira</i>	
373d Development of Model-Based Fault Detection Algorithm for Liquid Hydrogen Refueling System	501
<i>Gyeongwan Jeon, Yeonsoo Kim</i>	
373e Optimal Production of Solar Photovoltaic Panels in Mexico through a Hybrid Machine Learning and Mathematical Programming Approach.....	504
<i>Francisco J. L. Flores, Cesar Ramírez-Márquez, Luis F. Lira-Barragán, Eusiel Rubio-Castro, José M. Ponce-Ortega</i>	
373f Demand Response Strategies for Management of Residential Natural Gas Consumption	506
<i>Hussain Al Dandan, Nael El-Farra</i>	
373g Improvements to GPU-Enhanced Deterministic Global Optimization.....	508
<i>Robert Gottlieb, Matthew Stuber</i>	
373h A Global Optimization Approach for the Symbolic Design of Iterative Algorithms	510
<i>Ilias Mitrai, Nikolaos Sahinidis</i>	
373i An Objective Reduction Algorithm for Nonlinear Many-Objective Optimization Problems.....	512
<i>Hongxuan Wang, Andrew Allman</i>	
373j An Estimation-Assisted Real-Time AC Optimal Power Flow.....	514
<i>Can Li, Gonzalo E. C. Flores</i>	
373k Direct Quantum Optimization of a Class of MINLP Involving Quadratic and Signomial Terms	517
<i>Ashfaq Iftakher, Faruque Hasan</i>	
373l Enhancing Stochastic Optimization through Topology Data Analysis: A Novel Approach for Improved Efficiency and Robustness	519
<i>Ching-Mei Wen, Marianthi Ierapetritou</i>	

373n Open-Loop Simulation Surrogates for Closed-Loop Global Optimization of Sustainable Processes	521
<i>Lucas F. Dos Santos, Dion Jakobs, Gonzalo Guillen-Gosalbez</i>	
373o Multi-Fidelity Reinforcement Learning for Dynamic Optimisation of Laminar Mixing System.....	524
<i>Mosayeb Shams, Nausheen Basha, Antonio Del Rio Chanona, Omar Matar</i>	
373p Partial Optimal Transport for Data-Driven Distributionally Robust Optimization with Consideration of Outliers	525
<i>Shu-Bo Yang, Zukui Li</i>	
373r Data-Driven Bi-Level Optimization of Hyperparameters for Machine Learning Models	527
<i>Amir Shahbazi, Hasan Nikkhah, Zahir Aghayev, Burcu Beykal</i>	
373s Towards an Integrated Wide Approach for Sustainable Field Recovery	529
<i>Shakeel Ramjane</i>	
373t Surrogate-Based Optimization for the Recovery of Critical Minerals and Rare Earth Elements	537
<i>Dimitrios Fardis, Donghyun Oh, Nikolaos Sahinidis</i>	
373u Multiscale Optimization Via Linear Model Decision Tree Surrogates	538
<i>Ethan Sunshine, John Kitchin, Carl Laird, Sneha Akhade</i>	
373v Input Convex LSTM for Fast Machine Learning-Based Optimization	539
<i>Zihao Wang, Wenlong Wang, Zhe Wu</i>	
373x Circular Economy Approach to Monetize Palm Oil Agricultural Residues	540
<i>Javier O. L. Prada, Ariel Uribe-Rodriguez</i>	
373y On Including Weather Extremes in the Design and Operation of Renewable Power Systems.....	541
<i>Ricardo P. De Lima, Farah Souayfane, Jefferson Riera, Hayssam Dahrouj, Omar Knio</i>	
373z A Multi-Scale Optimization Framework for a Sustainable Energy Transition in Urban Areas.....	544
<i>Javiera V. Zambrano, Styliani Avraamidou</i>	
373aa A Nonconvex MIQCP Model for Optimal Scheduling of Furnaces Shutdown in a Steam-Cracking Ethylene Plant Under Demand Uncertainty	546
<i>Erica P. Schulz, Guillermo Durand, Maria S. Diaz, Ignacio Grossmann</i>	
373ab Industrial Volatile Organic Compound (VOC) Capture Performance Evaluation Via Dynamic Simulation, MILP Scheduling and Economic Analysis.....	547
<i>Vasiliki E. Tzanakopoulou, Michael Pollitt, Daniel Castro-Rodriguez, Dimitrios Gerogiorgis</i>	
373ac A Model for the Autoclave Low-Density Polyethylene (LDPE) Industrial Process.....	549
<i>Artur Jesus, Pedro Castro, André Vilelas</i>	
373ad Panoramic and Cyclical Operational Stability Indicators for New KPIs Contributing to the SDGs	551
<i>Tetsuya Wada</i>	
373ae Data-Driven Approaches for the Optimization of Complex Planning and Scheduling Problems in Multi-Product Industries.....	554
<i>Hasan Nikkhah, Syu-Ning Johnn, T. S. A. Meng-Lin, Amir Shahbazi, Zahir Aghayev, Styliani Avraamidou, Vassilis Charitopoulos, Burcu Beykal</i>	

373af Navigating the Energy Transition Towards Hydrogen as an Energy Carrier: A Mathematical Programming Approach for Scheduling Hydrogen Supply Chain Operations	556
<i>Dnyanesh Deshpande, Rajagopalan Srinivasan, Iftekar Karimi</i>	
373ag Predictive Resilience and Equitable Risk Assessment in Supply Chains Via Consensus-Driven Inverse Neural Network on Interoperable Blockchains.....	558
<i>Kazi Khoda</i>	
373ah Using LP Relaxation to Speed up Solution of Large-Scale Scheduling Problems.....	560
<i>Iiro Harjunoski</i>	
373ai Multi Agent Reinforcement Learning and Graph Neural Networks for Inventory Management	561
<i>Niki Kotecha, Antonio Del Rio Chanona</i>	
373aj Learning to Reduce Dimensionality in Mixed Integer Optimization.....	563
<i>Niki Triantafyllou, Maria M. Papathanasiou</i>	
373ak Learning Predictive Classifier Models of the Correlating Nature of Cost and Emissions Objectives in Moving-Horizon Demand Response	565
<i>Hongxuan Wang, Andrew Allman</i>	
373al A Two-Stage Robust Optimization Framework for the Design of Flexible Supply Chains with Mobile Production Modules	567
<i>Congqin Ge, Zhihong Yuan, Qi Zhang</i>	
373am A Predictive-Reactive Framework for Large-Scale Dynamic Crude Oil Scheduling	568
<i>Wanting Zhang, Pedro Castro, Wenli Du</i>	
373ao A Two-Layer Integrated Scheduling and Economic Control Scheme for Demand Side Management of Chemical Process	571
<i>Chrysanthi Papadimitriou, Jan Schulze, Alexander Mitsos</i>	
373ap A New MIQCP Continuous-Time Formulation for a Class of Maritime Inventory Routing Problems.....	574
<i>Pedro Castro</i>	
373aq Smart Control to Improve the Economic Benefits of the Battery Energy Storage System at the Industrial Facility.....	576
<i>Jiwei Yao, Tao Gao, Kody Powell</i>	
373as Optimal Design and Operation of Solid-Oxide Cell Systems Considering Chemical and Physical Degradation Under Seasonal Variation	578
<i>Nishant V. Giridhar, Quang M. Le, Douglas A. Allan, Stephen Zitney, Debangsu Bhattacharyya</i>	
373at Electrolyzer Plant Scheduling for Hydrogen Production and Power Market Participation in Frequency Containment Reserves	580
<i>Dimitrios K. Varvarezos, Salvador Perez-Uresti</i>	

10B: INVITED SESSION IN HONOR OF PROF. PRODRAMOS DAOUIDIS

312a Distributed Control and Estimation of Chemical Plants: Loop Partitioning and Design	582
<i>Panagiotis Christofides, Jinfeng Liu</i>	
312b Understanding Process Dynamics and Control over Multiple Length and Time Scales.....	583
<i>Michael Baldea</i>	

312d Traversing from Trees to the Woods: Role of Graph Theory in Understanding and Controlling Networks in Chemical Engineering.....	584
<i>Srinivas Rangarajan</i>	
312e Flexible Process Design and Operation with Distributed Control System Considering Uncertainties.....	585
<i>Seongmin Heo</i>	
312g Learning to Observe, Learning to Analyze, and Learning to Control.....	586
<i>Wentao Tang</i>	
312h Accelerating the Solution of Model Predictive Control Problems Via Machine Learning	588
<i>Ilias Mitrai</i>	

10B: MODELING, CONTROL, AND OPTIMIZATION OF ENERGY SYSTEMS I

116a Handling Model Mismatch in Economic Model Predictive Control for Heat Pump Water Heaters.....	589
<i>Loren De La Rosa, Caton Mande, Matthew Ellis</i>	
116b Predictive Control Strategy for Hydrogen Production by Proton Exchange Membrane Electrolyzer CELLS Using Renewable Energies	591
<i>Huquem Lopes, Marcilio Maximo, Márcio Martins, Heleno Bispo</i>	
116c Beyond Price-Taker: Multiscale Optimization of a Wind-Battery Integrated Energy System within the Wholesale Electricity Market	592
<i>Xinhe Chen, Xian Gao, Radhakrishna T. Gooty, Darice Guittet, Bernard Knueven, John Sirola, Alexander Dowling</i>	
116e Process Modeling and Operability Analysis for the Optimization of a Proton-Conducting Solid Oxide Electrolyzer for Green Hydrogen Production.....	595
<i>Krishna M. Busam, Beatriz Dantas, Claudemi Nascimento, Wenyuan Li, Fernando Lima</i>	
116f Multi-Period Dynamic Optimization of Multi-Scale Energy Systems	596
<i>Nishant V. Giridhar, Douglas A. Allan, Eric A. Liese, Stephen Zitney, Lorenz Biegler, Debangsu Bhattacharyya</i>	
116g Can Climate Change Mitigation be Catalyzed through Green Hydrogen Coupled with Crypto's Resurgence?	598
<i>Apoorv Lal, Fengqi You</i>	
116h Demonstration of a Cloud-Based Supervisory Economic Model Predictive Control for Residential Heat Pump Water Heaters.....	600
<i>Loren De La Rosa, Fred Meyers, Caton Mande, Matthew Ellis</i>	
116i Learning-Enabled Hybrid Modeling and Economic Predictive Control of Carbon Capture Process for Ship Decarbonization.....	602
<i>Xuewen Zhang, Kuniadi W. Huang, Dat-Nguyen Vo, Minghao Han, Benjamin Decardi-Nelson, Xunyu Yan</i>	

10C: PLANNING AND OPERATION OF ENERGY SYSTEMS

117a Optimization Model and Algorithm for Capacity Planning and Operation of Reliable and Carbon-Neutral Power Systems with High Penetration of Renewable Generation.....	604
<i>Seolhee Cho, Javier Tovar-Facio, Benjamin P. Omell, Radhakrishna T. Gooty, Christopher D. McLean, Anthony P. Burgard, John Siirola, Kyle Skolfield, John Shinn, Ignacio Grossmann</i>	
373ar Dynamic Optimization with Intertemporal Uncertainty in Natural Gas Pipeline Operations Using Stochastic Finite Volume.....	607
<i>Saif R. Kazi, Kaarthik Sundar, Svetlana Tokareva, Anatoly Zlotnik, Sidhant Misra</i>	
117c Flexible Technoeconomic Analysis Tools for Evaluating Emerging Power Generation Technologies in Hourly Electricity Markets Using IDAES and Pyomo.....	608
<i>Daniel Laky, Radhakrishna T. Gooty, Maojian Wang, Anthony P. Burgard, Alexander Dowling</i>	
117d Discrete Approximation Model for the Optimal Planning of CO ₂ Injection into Deep Saline Aquifers.....	610
<i>Demian Presser, Diego Cafaro, Ignacio Grossmann, Saurabh S. Usgaonkar, Pratik Misra, Qi Zhang, Heather Binagia, Wayne Rowe, Sanjay Mehta</i>	
117e Reinforcement Learning-Based End-Effect Mitigation in Solar-Wind Energy Market System Using Value Function Approximation	613
<i>Dongho Han, Seongmin Heo</i>	
117f Adversarial Data in Demand Side Management.....	615
<i>Eike Cramer</i>	
117g What Does the Industry Want from Machine Learning? Interpretable Modelling Algorithm and Robust Optimization for the Energy-Efficient Operation of Power Plants Case Study	617
<i>Vivek Dua, Waqar M. Ashraf</i>	

10C: PLANNING, SCHEDULING, SUPPLY CHAIN AND LOGISTICS I

195a Developing Periodic Replenishment Plans for Vendor Managed Inventory Customers in the Context of Mixed Networks	620
<i>Abilash Subbaraman, Zachary Wilson, Ayman Mhamdi, Mukesh Rungta, Jeffrey E. Arbogast, Chrysanthos Gounaris</i>	
195b Using Linear Model Decision Tree Surrogates to Integrate Plant Scheduling with Supply Chain Under Disruptions	622
<i>Daniel Ovalle, Javal Vyas, Carl Laird, Ignacio Grossmann</i>	
195c Optimization Methods for Plastics Management Supply Chain Design.....	624
<i>Shuheng Wang, Christos Maravelias</i>	
195d A Disjunct Generation and Elimination Algorithm for Discrete-Time Network Scheduling with Variable Processing Times.....	627
<i>David A. L. Romero, Luis Ricardez-Sandoval</i>	
195e Portfolio Optimization of Carbon Capture, Utilization, and Sequestration Considering the Effect of Technological Learning	630
<i>Pooja Z. Santhamoorthy, Selen Cremaschi</i>	

195f Incorporating Cross-Perishability Effects in Optimization of Supply Chains of Multiple Perishable Products: Modeling and Solution Strategies	633
<i>Shashank Venkatesan, Fernando Lejarza, Michael Baldea</i>	

195g Integrated Refinery Planning and Utility Operations for Optimal Energy and Emissions Management	635
<i>Andrea P. Ortiz-Espinoza, Salvador I. Pérez-Uresti, Dimitrios K. Varvarezos</i>	

10B: PREDICTIVE CONTROL AND OPTIMIZATION

457a Integrating Regulatory Rule-Based Control Logic in Supervisory Economic Model Predictive Control.....	636
<i>Hossein K. Neyestanaki, Loren De La Rosa, Matthew Ellis</i>	

457b Retro: A Real-Time Risk-Based Optimization Framework for Safe and Smart Operations	638
<i>Yuhe Tian, Efstratios Pistikopoulos, Faisal Khan, Shayan Niknezhad, Yuanxing Liu, Sahithi S. Akundi, Beatriz Dantas, Austin Braniff</i>	

457c Continuous Learning of the Value Function Utilizing Deep Reinforcement Learning to be Used as the Objective in Model Predictive Control	640
<i>Daniel Beahr, Elijah Hedrick, Debangsu Bhattacharyya</i>	

457d Integrated Scheduling and Control Formulation for Processes Controlled by Nonlinear MPC Systems.....	642
<i>Daniela D. De Lima Silva, Christopher Swartz</i>	

457e MPC Is a Decision Tree, and We Know How to Optimize It	645
<i>Jiayang Ren, Yankai Cao</i>	

457f Execution-Time-Certified and Fast MPC Solver	647
<i>Liang Wu, Richard Braatz</i>	

457g Graph-Based Symmetry Detection and Elimination for Optimal Process Control of Numbered-Up Modular Facilities.....	648
<i>Yi Dai, Elliot Cooper, Andrew Allman</i>	

457h Multistage Economic Nonlinear Model Predictive Control of Gas Pipeline Networks Under Uncertainty	649
<i>Sakshi Naik, Lorenz Biegler</i>	

457i Nonlinear Model Predictive Control with Performance-Index-Triggered Model Re-Identification	651
<i>Daniel Kestering, Fernando Lima</i>	

10A: PROCESS DESIGN FOR A NET ZERO CARBON ECONOMY I

13a Optimal Design of an Absorbent-Enhanced Ammonia Synthesis Process for Solar Thermochemical Energy Storage	652
<i>Oswaldo Andres-Martinez, Prodromos Daoutidis, Qi Zhang</i>	

13b Novel Column Configurations and Operational Strategies for Distillation with Electric Heating	654
<i>Samuel Mercer, Michael Baldea</i>	

13c Co-Electrolysis of Water and Organic Molecules: Thermo-Economically Promising?	655
<i>Katharina M. Ebeling, Dominik Bongartz, Sonja Mürtz, Regina Palkovits, Alexander Mitsos</i>	

371ac Optimal Scale Analysis of Rotating Packed Bed (RPB) for Modular CO ₂ Capture.....	657
<i>Howoun Jung, Nohjin Park, Jay H. Lee</i>	
13e Power System Planning and Scheduling Integrating Hydrogen and Ammonia Long-Term Storage Via Time-Adaptive Modelling Towards Net-Zero Heat and Power Sectors.....	658
<i>Georgios Bounitsis, Vassilis Charitopoulos</i>	
13f Interpretation of Activation and Concentration Overpotentials in Electrochemical Systems	660
<i>J. Raphael Seidenberg, Alexander Mitsos, Dominik Bongartz</i>	
13g Superstructure Optimization of Algae Based Biorefinery for Sustainable Production of Value Added Products through Carbon Sequestration.....	662
<i>Swaminathan Sundar, Rahul Kakodkar, Dustin Kenefake, Efstratios Pistikopoulos</i>	

INDUSTRIAL APPLICATIONS IN INTELLIGENT OPERATIONS

519a Reinforcement Learning Based Optimization of Non-Linear Processes: Industrial Applications.....	663
<i>Kalpesh Patel, Taib Abang, Ammar Bakhurji</i>	
519d Enhancing Data-Driven Anomaly Detection in Biopharmaceutical Manufacturing through Domain Adaptation and Machine Learning: A Case Study on Industrial Freeze-Dryers	673
<i>Gianluca Lombardini, Sara Badr, Christian Schmid, Stephanie Knüppel, Hirokazu Sugiyama</i>	
519e A Hybrid Clustering Approach for Fault Detection in HVAC Systems	675
<i>Hesam Hassanpour, Amir H. Hamed, Prashant Mhaskar, John House, Timothy Salisbury</i>	
519f Light Olefin Ratio Prediction Using Data-Driven Model of Fischer-Tropsch Synthesis with Catalyst Descriptors.....	676
<i>Heehyun Choi, Woosung Jeong, Jonghwan Oh, I. M. Hyeonseo, Yong S. Lee, Janggeun Lee, Jiyong Kim</i>	
519g Linking Bayesian Optimization with Deterministic Global Gaussian Process Optimization for Active Determination of Optimal Policies: From Catalysis to Cancer Treatment.....	678
<i>Anastasia Georgiou, Arjun Manoj, Ioannis G. Kevrekidis, Trung V. Phan</i>	

10: SOFTWARE TOOLS AND IMPLEMENTATIONS FOR PROCESS SYSTEMS ENGINEERING

193a A Holistic Assessment Tool for Tracking and Quantifying End-of-Life Plastic Management through the Supply Chain.....	679
<i>Matthew Conway, John D. Chea, Kirti Yenkie, Pahola T. Benavides, Gerardo Ruiz-Mercado</i>	
193b Improvements to EAGO.jl: Consolidation and Performance	680
<i>Dimitri Alston, Robert Gottlieb, Matthew Stuber</i>	
193c Graph-Theoretic Representations of Physical Phenomena in Process Simulation: Concepts, Algorithms, and Software Implementation.....	682
<i>Yoel Cortes-Pena, Victor M. Zavala</i>	
193d TorchSISSO: A Python Package for Explainable AI Using the Sure Independence Screening and Sparsifying Operator Method with GPU Support.....	684
<i>Madhav Muthyala, Farshud Sorourifar, Joel Paulson</i>	

193e Advances on a Solver for Multiparametric Model Predictive Control.....	686
<i>Dustin Kenefake, Efstratios Pistikopoulos</i>	
193f Nonconvex Robust Optimization for the Design and Operation of Advanced Energy Systems Using Pyros	687
<i>Jason Sherman, John D. Sirola, Chrysanthos E. Gounaris</i>	
193g Pyomo.Doe 2.0: Improved Usability and Computational Efficiency for Science-Based Design of Experiments (SBDoe).....	689
<i>Daniel Laky, Katherine A. Klise, Shawn Martin, Jialu Wang, Bethany Nicholson, John D. Sirola, Alexander Dowling</i>	
193h Infinite models.JI: Accelerating Infinite-Dimensional Optimization Problems on CPUs and GPUs	692
<i>Joshua Pulsipher, Sungho Shin</i>	

10A: PROCESS SYNTHESIS AND DESIGN FOR SUSTAINABILITY I

456a A Fast Computational Framework for the Design of Sustainable Solvent-Based Plastic Recycling Processes	694
<i>Aurora Del Carmen Munguia Lopez, Panzheng Zhou, Ugochukwu Ikegwu, Reid Van Lehn, Victor Zavala</i>	
456b Toward Sustainable Lithium Production: Process Modeling, Techno-Economic Analysis, and Life Cycle Impacts of Recovering Lithium from Geothermal Brines	697
<i>Hasan Nikkiah, Andrea Di Maria, Giuseppe Granata, Burcu Beykal</i>	
456c A System-Dynamics Based Approach for Modeling Circular Economy Networks for Plastic Recycling.....	699
<i>Daniel Pert, Ana I. Torres</i>	
456d Process Systems Engineering Enables Efficient and Sustainable Membrane-Based Critical Material Separations.....	700
<i>Molly Dougher, Jason Yao, Andrew Lee, Laurianne Lair, Jonathan Ouimet, William Phillip, Thomas J. Tarka, Chrysanthos Gounaris, Alexander Dowling</i>	
456e Improving Sustainability in the Water Sector with Reverse Electrodialysis Optimization for Renewable Electricity Generation from Salinity Gradients.....	703
<i>Carolina Tristán, Marcos Fallanza, Raquel Ibañez, Ignacio Grossmann, David E. Bernal Neira</i>	
456f Integration of Flexibility and Resilience in the Design of Co-Located Water and Power Systems.....	706
<i>Natasha Chrisandina, Aovi Deshpande, Fahad Al-Fadhli, Eleftherios Iakovou, Efstratios Pistikopoulos, Mahmoud El-Halwagi</i>	
456g Process Modeling and Sensitivity Studies for Integrated Carbon Capture and Conversion with Ionic Liquids.....	707
<i>Adhika Retnanto, Mark Stadtherr, Michael Baldea</i>	

PROCESS MONITORING AND FAULT DETECTION

314a Comparison of Machine Learning Techniques for the Modeling and Monitoring of Cryogenic Air Separation Unit Startups.....	709
<i>Bahareh Hassani, Yajun Wang, Ankur Kumar, Jesus Flores-Cerrillo, Jin Wang, Q. Peter He</i>	

314b Model-Predictive Fault Tolerant Control of Safety-Critical Processes, Based on Dynamic Safety Set.....	710
<i>Ritu Ranjan, Costas Kravaris</i>	
314c Exploring Generative Adversarial Networks for Fault Detection and Diagnosis in Chemical Processes: A Distillation Column Study	713
<i>Amir H. Hamed, Vladimir Mahalec, Prashant Mhaskar</i>	
314d Interpretable Fault Detection in Chemical Processes Using Large Language Models	715
<i>Abdullah Khan, Hao Chen, Gonzalo Constante-Flores, Can Li</i>	
314e Integration of Dynamic Risk and Control for Enhanced Safety and Operational Efficiency	716
<i>Sahithi S. Akundi, Yuanxing Liu, Austin Braniff, Beatriz Dantas, Shayan Niknezhad, Yuhe Tian, Faisal Khan, Efstratios Pistikopoulos</i>	
314f Development of an Online Health Monitoring Framework for High Temperature Boiler Components by Using Hybrid First Principles-Data-Driven Models.....	717
<i>Vivek Saini, Angan Mukherjee, Samuel Adeyemo, Debangsu Bhattacharyya</i>	
314g Fault Detection for an Atomic Layer Etching Process Using Machine Learning.....	720
<i>Henrik Wang, Matthew Tom, Feiyang Ou, Gerassimos Orkoulas, Panagiotis Christofides</i>	

10B: MODELING, ESTIMATION AND CONTROL OF INDUSTRIAL PROCESSES

518a Development of Constrained Estimation Algorithms for Distributed Parameter Systems for Satisfying Mass and Energy Conservation	721
<i>Vivek Saini, Debangsu Bhattacharyya</i>	
518b Optimizing Bioreactor Efficiency at Industry-Scale: Leveraging CFD and Real-World Data for Advanced Spatiotemporal Analysis through a Compartment Modeling Approach.....	724
<i>Parth Shah, Satchit Nagpal, Joseph Kwon, Jaehoon Cho</i>	
518c Closed-Loop Control for Uncertainty Mitigation and Disturbance Rejection in Cryogenic Air Separation Unit Startup	726
<i>Anthony Quarshie, Jose Matias, Christopher Swartz, Yanan Cao, Yajun Wang, Jesus Flores-Cerrillo</i>	
518d Computational Studies of Flushing Dynamics during Product Changeovers in Multi-Product Pipelines	729
<i>Barnabas Gao, David Theuma, Steven Roth, Michael Fracchiolla, Emma Padros, Kirti Yenkie, Robert Hesketh, C. Stewart Slater</i>	
518e Nonlinear Model Predictive Control of the Monoclonal Antibody Glycosylation in Cell Culture.....	730
<i>Yingjie Ma, Jing Guo, Richard Braatz</i>	
518f An Experimental Study of Feedback Control for an Electrically-Heated Steam Methane Reforming Process	731
<i>Berkay Citmaci, Xiaodong Cui, Dominic Peters, Yash Kadakia, Fahim Abdullah, Ahmed Almunaifi, Carlos Morales-Guio, Panagiotis Christofides</i>	
518g Nonlinear Model Predictive Control of Flexible Ammonia Production	732
<i>Baiwen Kong, Qi Zhang, Prodromos Daoutidis</i>	

518h Implications of Process Heat Electrification on the Design, Control and Operation of Integrated Chemical Processes	734
<i>Jong H. Rho, Michael Baldea, Elizabeth Endler, Monica Heredia, Vesna Bojovic, Pejman Pajand</i>	

10C: IN HONOR OF PROF. IGNACIO GROSSMANN'S 75TH BIRTHDAY - II (INVITED TALKS)

577a Recent Advances in Multi-Parametric Optimization and Explicit Model Predictive Control.....	735
<i>Efstathios Pistikopoulos</i>	
577b Automated Electricity Bidding Solution Under Price Uncertainty	736
<i>Iiro Harjunkoski</i>	
577c MIPs Vs MPCCs: A Perspective for Process Engineering.....	737
<i>Lorenz Biegler</i>	
577d The Design of International Supply Chains Integrating Sustainability: A Multi-Objective Optimization Approach	738
<i>Metin Turkey</i>	
577e Continuous Production Scheduling: Representation, Modeling and Computational Advances.....	739
<i>Christos Maravelias, Amin Samadi</i>	

10A: IN HONOR OF PROFESSOR IGNACIO GROSSMANN'S 75TH BIRTHDAY - I (INVITED TALKS)

517a Optimization and Machine Learning Nexus: Model-Based and Data-Driven Approaches	741
<i>Nikolaos Sahinidis</i>	
517b Data-Driven Discovery of Decision-Making Processes Via Inverse Optimization	742
<i>Qi Zhang</i>	
517c OptiChat: Explaining Optimization Problems Using Large Language Models	743
<i>Can Li</i>	
517d Leveraging PSE and AI for Decarbonization	744
<i>Fengqi You</i>	
517f Generalized Disjunctive Programming: A Trip Down Memory Lane from Development, Extensions, and Future Perspectives	745
<i>David E. B. Neira</i>	

10C: DESIGN AND OPERATIONS UNDER UNCERTAINTY

15a Long-Term Multi-Stage Retrofit Planning of Carbon Negative NGCC Plants with Direct Air Capture Under Carbon Market Uncertainty	747
<i>Pengfei Cheng, Dillard L. Robertson, Matthew Realff, Joseph Scott</i>	
15b A Framework for the Optimization of Water Treatment Processes Under Uncertainty Assessed through Process Operability	749
<i>Hunter Barber, Fernando Lima</i>	

15c Leveraging Reinforcement Learning and Evolutionary Algorithms for Dynamic Multi-Objective Decision Making in Supply Chain Management	751
<i>Niki Kotecha, Yue Qiu, Antonio Del Rio Chanona</i>	
15d Enhancing the Resilience of Process Operations: Integrating Adversarially Robust Real-Time Optimization and Control with Adaptive Learning	753
<i>Akhil Ahmed, Antonio Del Rio Chanona, Mehmet Mercangöz</i>	
15e A Two-Stage Stochastic Optimization Approach for the Design of Sustainable Ammonia Supply Chain Networks.....	756
<i>Matthew Palys, Ilias Mitrai, Prodromos Daoutidis</i>	
15f A Modified Integer L-Shaped Method for Two-Stage Stochastic Programs	758
<i>Benjamin P. Riley, Prodromos Daoutidis, Qi Zhang</i>	
15g Towards a Multi-Stage Stochastic Optimization Approach for Resilient Supply Chain Network Design and Operations	759
<i>Shivam Vedant, Natasha Chrisandina, Catherine Nkoutche, Funda Iseri, Halil Iseri, Eleftherios Iakovou, Mahmoud El-Halwagi, Efstratios Pistikopoulos</i>	

10C: PLANNING, SCHEDULING, SUPPLY CHAIN AND LOGISTICS II

313a Data-Driven Decarbonization of an Integrated Gas-Oil Separation Network Under Uncertainty	761
<i>Abdullah Bahamdan, Nilay Shah, Ehecatl A. Del Rio Chanona</i>	
313b Design and Operation Planning for Delivery and Storage of Hydrogen Gas Via Pipelines	762
<i>Sophia Shi, Michael Baldea, Brian A. Korgel</i>	
313c Incorporating Total Cost of Process Risk (TCPR) in the Design of Sustainable Hydrogen Economy.....	764
<i>Austin Johnes, Faisal Khan, Faruque Hasan</i>	
313d Enhancing Pharmaceutical Supply Chain Resilience: A Multi-Objective Study with Disruption Management	765
<i>Oluwadare Badejo, Marianthi Ierapetrinou</i>	
313e Joint Optimization of Fair Facility Allocation and Robust Inventory Management for Perishable Consumer Products	766
<i>Saba G. Naraghi, Zheyu Jiang</i>	
313f Optimizing the Sugar Beet-to-Isopropanol Supply Chain: A Model Development with Emphasis on CO ₂ Utilization Biotechnology	767
<i>Ching-Mei Wen, Marianthi Ierapetrinou</i>	
313g Agent-Based Modelling of Peer-to-Peer Trading of Electricity with Heat Pump Integration in a Local Energy Market	768
<i>Ioanna Kalospyrou, Timothy Hutty, Solomon F. Brown</i>	

10A: PROCESS DESIGN FOR A NET ZERO CARBON ECONOMY II

249a Hydrogen Pipeline Networks: Repurposing of Natural Gas Networks Vs. Design from Scratch.....	769
<i>Danial H. Jamali, Caroline Ganzer, Kai Sundmacher</i>	

249b Systems Analysis of Industrial Electrification.....	772
<i>Caleb Geissler, Julia Granacher, Christos Maravelias</i>	
249c Bridging Molecular Insights to Industrial Scale: Developing a Multiscale Modeling Framework for Predicting Catalyst Deactivation for Dry Reforming of Methane Process	775
<i>Satchit Nagpal, Joseph Kwon</i>	
249d Net Present Value Optimization of an Integrated CO ₂ Capture Process Using Water Lean Solvents Under Dynamic Electricity Price for Multiple Regions.....	777
<i>M. Emdadul Haque, Stephen Summits, Quang M. Le, Paul Mobley, Vijay Gupta, Yuan Jiang, David Heldebrant, Charles J. Freeman, Benjamin P. Omell, Michael S. Matuszewski, Joseph A. Swisher, Phillip De Mello, Abhoyjit Bhowm, Debangsu Bhattacharyya</i>	
249e Netz-CMI: A User-Friendly Tool for Achieving Net-Zero Transition for the Chemical and Material Industries.....	779
<i>Farshid Nazemi, Amrita Sen, George Stephanopoulos, Bhavik Bakshi</i>	
249f Modeling of Steam Methane Reforming Reactor for Electrification through Induction Heating	781
<i>Yufei Zhao, Chengtian Cui, Lorenz Biegler, Cornelius Masuku</i>	
249g A Framework to Predict the Formation of Strong Acids in CO ₂ Transportation Systems.....	782
<i>Yifan Hao, Ronald Springer, Jiangping Liu, Mohiedin B. Hariri, Andrzej Anderko</i>	

10A: PROCESS SYNTHESIS AND DESIGN FOR SUSTAINABILITY II

630a Advancing Towards a Net-Negative Carbon Economy: Integrating Solid Direct Air Capture with Green Hydrogen Production for Economic Enhancement.....	783
<i>Sunwoo Kim, Jay H. Lee</i>	
630b Cost-Optimization of Hydrogen Refueling Stations with Mechanical and Electrochemical Hydrogen Compressors	786
<i>Georgia I. Prokopou, Johannes M. M. Faust, Alexander Mitsos, Dominik Bongartz</i>	
630c Synergistic Optimal Synthesis of Sustainable Methanol Production through Integrated Renewable Energy Storage and Carbon Utilization	788
<i>Patience B. Shamaki, Fernando Lima, Galo C. Le Roux</i>	
630d Design and Eco-Technoeconomic Comparison of Biomass Pyrolysis Byproduct Utilization Methods in Steelmaking	790
<i>James Rose, Giancarlo D. Ave, Thomas Adams</i>	
630e Multiobjective Two-Stage Methodology for Process and Product Design: Optimization of Hydrogen Storage Systems Based on LOHCs.....	793
<i>Carlos Prieto, Antonio Sánchez, Mariano Martin</i>	
630f Molecular Product Design Under Performance Constraints	795
<i>Sofia González, Zeynep Sumer, Carlos Amador, Prakash Madhav, Ajay Muralidharan, Mariano Martin, Claire S. Adjiman</i>	
630g Multiscale Design and Synthesis of Power-to-Liquid Process for Sustainable Aviation Fuel from CO ₂ and Renewable Energy.....	797
<i>Puneeth Agoram, Toufik Ahmed, Fatima Mahnaz, Jasan R. Mangalindan, Manish Shetty, Faruque Hasan</i>	

10B: ADVANCES IN PROCESS CONTROL II

250a Addressing Discrete Dynamic Optimization Via a Logic-Based Discrete-Steepest Descent Algorithm	799
<i>Zedong Peng, Albert Lee, David E. B. Neira</i>	
250b Impacts of Quantum Algorithms and Noise on Stability for Next-Generation Control Applications.....	801
<i>Keshav K. Rangan, Helen Durand</i>	
250c Model Validation Using Principles of Automated Theorem Proving.....	803
<i>Akkarakaran Leonard, Henrique Oyama, Helen Durand</i>	
250d Advancing Polymerization Process Control: A DNN-Accelerated kMC for Multimodal Molecular Weight Distribution	804
<i>Juhyeon Kim, Joseph Kwon</i>	
250e Improved Set-Based State Estimation for Nonlinear Discrete-Time Systems Using Constrained Zonotopes	805
<i>Brenner Santana, Joseph Scott</i>	
250f Uncertainty-Informed Dynamic Risk Control of Safety-Critical Reaction Processes with Bayesian State Estimation	807
<i>Austin Braniff, Larry Clevenger, Beatriz Dantas, Sahithi S. Akundi, Yuanxing Liu, Shayan Niknezhad, Faisal Khan, Efstratios Pistikopoulos, Yuhe Tian</i>	
250g Choosing between Distributed and Centralized Strategies in Moving Horizon Model Predictive Control.....	809
<i>Elliot Cooper, Andrew Allman</i>	
250h Meta-Adaptive Koopman Operators for Learning-Based Model Predictive Control of Parametrically Uncertain Nonlinear Systems	810
<i>Minghao Han, Kiwan Wong, Adrian Wing-Keung Law, Xunyuan Yin</i>	
250i Mitigating the Impact of Nondeterminism Due to Process Control Implemented on a Quantum Computer.....	813
<i>Shilpa Narasimhan, Helen Durand</i>	

10B: MODELING, CONTROL, AND OPTIMIZATION OF ENERGY SYSTEMS II

631a Mathematical Model Validation Using Solar Volumetric Receiver Datasets: Enhancing High-Temperature Heating through Obtaining Absorber Thermophysical Properties.....	815
<i>Aysha Melhim, Konstantinos E. Kakosimos, Fathya Salih</i>	
631c Stochastic Model Predictive Control with Deep Generative Disturbance Models: Application to Control of Building Energy Systems	816
<i>Farshud Sorourifar, Joel Paulson, Ye Wang, Rien Quirynen, Christopher Laughman, Ankush Chakrabarty</i>	
631d Real-Time Monitoring and Control of Lab-Scale Hydrogen Energy Systems: An Experimental and Modeling Approach.....	818
<i>Yuanxing Liu, Sahithi S. Akundi, Austin Braniff, Beatriz Dantas, Yuhe Tian, Shayan Niknezhad, Faisal Khan, Efstratios Pistikopoulos</i>	

631e An Integrated Long-Term Modeling Strategy for Decarbonizing the Road Mobility and Power Sectors in the Presence of Carbon Capture and Green Hydrogen	820
<i>Daniel Fontecha, Ricardo P. De Lima, Omar Knio</i>	
631g Process Digital Twins for Saudi Aramco's Hydrocarbon Value Chain	825
<i>Yufeng He, Abdullah Alghazal, Gabriel Winter</i>	
631h Design of an Estimation-Based Model Predictive Control System for an Electrically-Heated Steam Methane Reforming Process.....	826
<i>Xiaodong Cui, Berkay Citmaci, Dominic Peters, Fahim Abdullah, Yifei Wang, ChiaHsuan Hsu, Parth Chheda, Carlos Morales-Guio, Panagiotis Christofides</i>	
631i Control and Estimation of the Heat Equation: Real-Time Experimental Application on a Metal Slab.....	827
<i>Guilherme O. Cassol, Stevan Dubljevic</i>	

10B: DATA-DRIVEN MODELING, ESTIMATION AND OPTIMIZATION FOR CONTROL II

576a Data-Driven Estimation of Controller-Actuator False Data Injection Attacks in Process Systems.....	829
<i>Aatam Gajjar, Matthew Ellis, Nael El-Farra</i>	
576c Multi-Objective Dynamic Reaction Process Design Based on Bayesian Optimization for Batch Reactors.....	831
<i>Yafeng Xing, Yachao Dong, Lei Zhang, Jian Du, Qingwei Meng</i>	
576d Topology-Aware Soft Sensor Modeling Leveraging Graph Neural Networks	833
<i>Maximilian Theisen, Gabriele M. H. Meesters, Artur M. Schweidtmann</i>	
576e Data-Driven Nonlinear State Observation with Lipschitz-Bounded Neural Networks	834
<i>Wentao Tang</i>	
576f Modeling and Simulation of Industrial Scaled Electro-Heated Steam Methane Reforming and Pressure Swing Adsorption Process	836
<i>ChiaHsuan Hsu, Berkay Citmaci, Xiaodong Cui, Fahim Abdullah, Dominic Peters, Carlos Morales-Guio, Panagiotis Christofides</i>	
576g A Unified Approach for Identifying Dynamic Models Together with Terminal Quality Models for Batch Processes	837
<i>Aswin Chandrasekar, Prashant Mhaskar</i>	
576h Development of a Machine Learning-Driven Surrogate Model for Steam Methane Reforming-Kinetics Towards Sustainable Hydrogen Production	838
<i>Ayooluwa Akintola, Yuhe Tian</i>	
576i Physics-Informed Machine Learning for CIP Optimization in Dairy Manufacturing	840
<i>Satayasaran Changdar, Behnaz R. Parjikelaei, Frans W. J. Van Den Berg, Serafim Bakalis</i>	

10B: AI/ML MODELING, OPTIMIZATION AND CONTROL APPLICATIONS II

711a Time-Series Integrated Surrogate Modeling for Control of Ammonia Synthesis and Adsorption Processes.....	841
<i>Amirsalar Bagheri, Thiago O. Cabral, Davood B. Pourkargar</i>	

711b A Multiparametric Approach to Solving NN Constrained Model Predictive Control Problems Effectively	843
<i>Dustin Kenefake, Efstratios Pistikopoulos</i>	
711c Beyond Molecular Structure: Predicting CO ₂ Solubility in Amine Solvents Under Varying Operating Conditions with Transformer Models	844
<i>Aahil Khambhawala, Silabrata Pahari, Chi-Ho Lee, Joseph Kwon</i>	
711d Predictive Control of Distributed Transportation Systems Using Physics-Informed Neural Network	846
<i>Lu Zhang, Junyao Xie, Stevan Dubljevic</i>	
711e A Q-Learning RL-MPC Algorithm Addressing Challenges Encountered in Renal Replacement Therapy	847
<i>Annabelle Lint, Gilles Clermont, Raghavan Murugan, Kianoush Kashani, Robert Parker</i>	
711f A Constraint on Classical Least Squares for Preprocessing Vibrational Spectra Containing Overlapping Non-Target Peaks	851
<i>Steven Crouse, Ronald Rousseau, Martha Grover</i>	
711g Causality Guided Minimization of Liquid Time Constant Neural Network Models	853
<i>William Farlessyost, Shweta Singh</i>	
711h Machine Learning-Based Model Predictive Control of an Electrified Steam Methane Reformer	855
<i>Yifei Wang, Berkay Citmaci, Xiaodong Cui, Dominic Peters, Fahim Abdullah, Carlos Morales-Guio, Panagiotis Christofides</i>	
711i An Implementable Reinforcement Learning Approach for Online Adaptation of Model Predictive Control	856
<i>Hesam Hassanpour, Ankur Kumar, Prashant Mhaskar</i>	

ADVANCES IN MACHINE LEARNING AND INTELLIGENT SYSTEMS II

196a Enhancing Oil Recovery Efficiency with Constrained Reinforcement Learning for Waterflooding Optimization	858
<i>Zahir Aghayev, Dimitrios Voulanas, Eduardo Gildin, Burcu Beykal</i>	
196b A Novel Object-Oriented Integrated Environment for Deep Learning Networks Utilizing Staggered Training Procedures and New Theoretical Concepts	860
<i>Bogdan Dorneanu, Mina Keykha, Vassilios S. Vassiliadis, Harvey Arellano-Garcia</i>	
196c Time-Series Regeneration with Conditional Recurrent Generative Adversarial Network for Battery State-of-Health Estimation	862
<i>Myisha A. Chowdhury, Qiugang Lu</i>	
196d Towards Grey-Box Modelling in Chromatographic Separation Processes	864
<i>Foteini Michalopoulou, Maria M. Papathanasiou</i>	
196e A Large Language Model for Chemical Process Engineering: PILOT	866
<i>Artur M. Schweidtmann</i>	
196f Computational Completion of Partial Chemical Reaction Equations	867
<i>Matthijs Van Wijngaarden, Gabriel Vogel, Jana Weber</i>	

196g Autonomous Faithful Retrosynthesis with Large Language Models: From Synthesis Planning to Experimental Procedures.....	868
<i>Xuan Liu, Solana Chiu, Huimin Zhao</i>	
196h Lyapunov-Stable Neural Network for Model-Based Control of Nonlinear Systems.....	869
<i>Wallace T. G. Yion, Ming Xiao, Guoquan Wu, Zhe Wu</i>	

ADVANCES IN MACHINE LEARNING AND INTELLIGENT SYSTEMS III

458a Diagnosing Infeasible Optimization Problems Using Large Language Models	870
<i>Hao Chen, Gonzalo Constante-Flores, Can Li</i>	
458b Physics-Informed Automated Discovery of Kinetic Models	871
<i>Miguel A. De Carvalho Servia, Ilya O. S. Cárdenas, Klaus Hellgardt, King K. Hii, Dongda Zhang, Antonio Del Rio Chanona</i>	
458c Computer-Aided Drug Virtual Screening Framework Based on the Binding Site Selectivity.....	875
<i>Xinhao Che, Qilei Liu, Fang Yu, Lei Zhang, Rafiqul Gani</i>	
458d A Model-Free Approach to Nonlinear State Observation from Video Data	877
<i>Cormak Weeks, Wentao Tang</i>	
458e Machine Learning-Based Model Predictive Control Using Real-Time Transfer Learning.....	880
<i>Aisha Alnajdi, Fahim Abdullah, Yash Kadakia, Panagiotis Christofides</i>	
458f Employing Weight Sharing in Recurrent Neural Network Construction for Model Predictive Control of Nonlinear Processes	881
<i>Mohammed Alhajeri, Yi M. Ren, Feiyang Ou, Fahim Abdullah, Panagiotis Christofides</i>	
458g Simultaneous Capacity and Power Fade Prediction of Lithium-Ion Batteries Using Multi-Task Learning	882
<i>Sangjun Jeon, Jaewook Lee, Seongmin Heo</i>	
458h Online Feedback Control of an Atomic Layer Etching Process Using Model Predictive Control Based on a Transformer Model	884
<i>Feiyang Ou, Henrik Wang, Julius Suherman, Gerassimos Orkoulas, Panagiotis Christofides</i>	

Author Index