

Michael Baldea: Publications

1. Mitsos, A.; Asprion, N.; Floudas, C. A.; Bortz, M.; Baldea, B.; Caspari, A.; Schaefer, P. "Challenges in Process Optimization for New Feedstocks and Energy Sources," *Computers & Chemical Engineering* **2018**, *113*, 209-221. <https://doi.org/10.1016/j.compchemeng.2018.03.013>
2. Dias, L.; Pattison, R. C.; Baldea, M.; Ierapetritou, M. G. "A Simulation-based Optimization Framework for Integrating Scheduling and Model Predictive Control, and Its Application to Air Separation Units," *Computers & Chemical Engineering* **2018**, *113*, 139-151. <https://dx.doi.org/10.1016/j.compchemeng.2018.03.009>
3. Simkoff, J. M.; Wang, S.; Baldea, M.; Chiang, L. H.; Castillo, I.; Bindlish, R.; Stanley, D. B. "Plant-model Mismatch Diagnosis and Estimation from Closed-loop Data for State-space Model Predictive Control," *Industrial & Engineering Chemistry Research* **2018**, *57*, 3732-3741. <https://dx.doi.org/10.1021/acs.iecr.7b04917>
4. Baldea, M.; Edgar, T. F.; Stanley, B.; Kiss, A. A. "Modularization in Chemical Processing," *Chemical Engineering Progress* **2018**, *114*(3), 46-54. [\[Linked Paper\]](#)
5. Costandy, J. G.; Edgar, T. F.; Baldea, M. "A Scheduling Perspective on the Monetary Value of Improving Process Control," *Computers & Chemical Engineering* **2018**, *112*, 121-131. <https://doi.org/10.1016/j.compchemeng.2018.01.019>
6. Tsay, C.; Pattison, R. C.; Piana, M. R.; Baldea, M. "A Survey of Optimal Process Design Capabilities and Practices in the Chemical and Petrochemical Industries," *Computers & Chemical Engineering* **2018**, *112*, 180-189. <https://doi.org/10.1016/j.compchemeng.2018.01.012>
7. Tsay, C.; Baldea, M. "Scenario-free Optimal Design under Uncertainty of the PRICO Natural Gas Liquefaction Process," *Industrial & Engineering Chemistry Research* **2018**, *57*, 5868-5880. <https://doi.org/10.1021/acs.iecr.7b03634>
8. Kelley, M. T.; Pattison, R. C.; Baldick, R.; Baldea, M. "An MILP Framework for Optimizing Demand Response Operation of Air Separation Units," *Computers & Chemical Engineering* **2018**, *110*, 35-52. <https://doi.org/10.1016/j.compchemeng.2017.11.021>
9. Tsay, C.; Pattison, R. C.; Baldea, M. "A Pseudo-transient Optimization Framework for Periodic Processes: Pressure Swing Adsorption and Simulated Moving Bed Chromatography," *AIChE Journal* **2017**. <https://doi.org/10.1002/aic.15987> *Invited paper for the inaugural issue of the "Futures" series
10. Ganesh, H. S.; Edgar, T. F.; Baldea, M. "Modeling, Optimization, and Control of an Austenitization Furnace for Achieving Target Product Toughness and Minimizing Energy Use," *Journal of Process Control* **2017**. <https://doi.org/10.1016/j.jprocont.2017.09.008> *Invited paper for the "Control of Energy Systems" special issue
11. Oudeck, A. D.; Edgar, T. F.; Baldea, M. "A Multi-scale Framework for Simultaneous Optimization of the Design and Operating Strategy of Residential CHP Systems," *Applied Energy* **2017**, *205*, 1495-1511. <http://dx.doi.org/10.1016/j.apenergy.2017.08.082>
12. Wang, R. C.; Edgar, T. F.; Baldea, M. "Data Visualization and Visualization-based Fault Detection for Chemical Processes," *Processes* **2017**, *5*(3), 45. <http://dx.doi.org/10.3390/pr5030045>

13. Baldea, M.; Edgar, T. F.; Stanley, B.; Kiss, A. A. “Modular Manufacturing Processes: Status, Challenges, and Opportunities,” *AIChE Journal* **2017**, 63(10), 4262-4272. <http://dx.doi.org/10.1002/aic.15872> *Perspective paper featured on the journal cover
14. Xu, S.; Lu, B.; Baldea, M.; Edgar, T. F.; Wojsznis, W.; Blevins, T.; Nixon, M. “An Improved Variable Selection Method for Support Vector Regression in NIR Spectral Modeling,” *Journal of Process Control* **2017**. <http://dx.doi.org/10.1016/j.jprocont.2017.06.001>
15. Tsay, C.; Pattison, R. C.; Baldea, M. “A Dynamic Optimization Approach to Probabilistic Process Design under Uncertainty,” *Industrial & Engineering Chemistry Research* **2017**, 56, 8606-8621. <http://dx.doi.org/10.1021/acs.iecr.7b00375> *invited contribution for the *I&EC Research virtual special issue “2017 Class of Influential Researchers”*
16. Wang, R. C.; Edgar, T. F.; Baldea, M.; Nixon, M.; Wojsznis, W.; Dunia, R. “A Geometric Method for Batch Data Visualization, Process Monitoring, and Fault Detection,” *Journal of Process Control* **2017**. <http://dx.doi.org/10.1016/j.jprocont.2017.05.011>
17. Wang, S.; Simkoff, J. M.; Baldea, M.; Chiang, L. H.; Castillo, I.; Bindlish, R.; Stanley, D. B. “Autocovariance-based Plant-model Mismatch Estimation for Linear Model Predictive Control,” *Systems & Control Letters* **2017**, 104, 5-14. <http://dx.doi.org/10.1016/j.sysconle.2017.03.002>
18. Wang, S.; Simkoff, J. M.; Baldea, M.; Chiang, L. H.; Castillo, I.; Bindlish, R.; Stanley, D. B. “Autocovariance-based MPC Model Mismatch Estimation for Systems with Measurable Disturbances,” *Journal of Process Control* **2017**, 55, 42-54. <http://dx.doi.org/10.1016/j.jprocont.2017.03.002>
19. Kumar, A.; Baldea, M.; Edgar, T. F. “Multi-resolution Model of an Industrial Hydrogen Plant for Plantwide Operational Optimization with Non-uniform Steam-methane Reformer Temperature Field,” *Computers & Chemical Engineering* **2017**, 107. <https://doi.org/10.1016/j.compchemeng.2017.02.040>
20. Tsay, C.; Pattison, R. C.; Baldea, M.; Weinstein, B.; Hodson, S. J.; Johnson, R. D. “A Superstructure-based Design of Experiments Framework for Simultaneous Domain-restricted Model Identification and Parameter Estimation,” *Computers & Chemical Engineering* **2017**, 107, 408-426. <http://dx.doi.org/10.1016/j.compchemeng.2017.02.014>
21. Tsay, C.; Pattison, R. C.; Baldea, M. “Equation-oriented Simulation and Optimization of Process Flowsheets with Detailed Spiral-wound Multistream Heat Exchanger Models,” *AIChE Journal* **2017**, 63(9), 3778–3789. <http://dx.doi.org/10.1002/aic.15705>
22. Wang, R. C.; Edgar, T. F.; Baldea, M. “A Geometric Framework for Monitoring and Fault Detection for Periodic Processes,” *AIChE Journal* **2017**, 63(7), 2719–2730. <http://dx.doi.org/10.1002/aic.15638>
23. Sowa, S. W.; Gelderman, G.; Leistra, A. N.; Buvanendiran, A.; Lipp, S.; Pitaktong, A.; Vakulskas, C. A.; Romeo, T.; Baldea, M.; Contreras, L. M. “Integrative FourD Omics Approach Profiles the Target Network of the Carbon Storage Regulatory System,” *Nucleic Acids Research* **2017**, 45 (4), 1673-1686. <https://doi.org/10.1093/nar/gkx048>
24. Kumar, A.; Baldea, M.; Edgar, T. F. A Physics-based Model for Industrial Steam-methane Reformer Optimization with Non-uniform Temperature Field,” *Computers &*



Chemical Engineering **2017**, 105(4), 224-236.

<http://doi.org/10.1016/j.compchemeng.2017.01.002> *invited paper for *Special Issue on Process Intensification*

25. Perez, K. X.; Baldea, M.; Edgar, T. F. "Development and Analysis of Residential Change-point Models from Smart Meter Data," *Energy and Buildings* **2017**, 139, 351-359. <http://dx.doi.org/10.1016/j.enbuild.2016.12.084>
26. Pattison, R. C.; Tsay, C.; Baldea, M. "Pseudo-transient Models for Multiscale, Multiresolution Simulation and Optimization of Intensified Reaction/Separation/Recycle Processes: Framework and a Dimethyl Ether Production Case Study," *Comput. Chem. Eng.*, 105(4), 161-172. <http://dx.doi.org/10.1016/j.compchemeng.2016.12.019> *invited paper for *Special Issue on Process Intensification*
27. Ganesh, H. S.; Edgar, T. F.; Baldea, M. "Model Predictive Control of the Exit Part Temperature for an Austenitization Furnace," *Processes* **2016**, 4(4), 53. <http://dx.doi.org/10.3390/pr4040053>
28. Touretzky, C. R.; Harjunkoski, I.; Baldea, M. "Dynamic Models and Fault Diagnosis-Based Triggers for Closed-loop Scheduling," *AIChE Journal* **2016**, 63(6), 1959-1973. <http://dx.doi.org/10.1002/aic.15564>
29. Heng, V. R.; Ganesh, H. S.; Dulaney, A. R.; Kurzawski, A. J.; Baldea, M.; Edgar, T. F.; Ezekoye, O. A. "Energy-oriented Modeling and Optimization of a Heat Treating Furnace," *Journal of Dynamic Systems, Measurement, and Control* **2017**, 139(6), 061014. <http://dx.doi.org/10.1115/1.4035460>
30. Pattison, R. C.; Touretzky, C. R.; Baldea, M.; Harjunkoski, I. "Moving Horizon Closed-loop Production Scheduling using Dynamic Process Models," *AIChE Journal* **2016**, 63(2), 639-651. <http://dx.doi.org/10.1002/aic.15408>
31. Piñeros, W. D.; Baldea, M.; Truskett, T. M. "Designing convex Repulsive Pair Potentials That Favor Assembly of Kagome and Snub Square Lattices," *Journal of Chemical Physics* **2016**, 145, 054901. <http://dx.doi.org/10.1063/1.4960113>
32. Korambath, P.; Wang, J.; Kumar, A.; Davis, J. F.; Graybill, R.; Schott, B.; Baldea, M. "A Smart Manufacturing Use Case: Furnace Temperature Balancing in Steam Methane Reforming Process via Kepler Workflows," *Procedia Computer Science* **2016**, 80, 680-689. <http://dx.doi.org/10.1016/j.procs.2016.05.357>
33. Donahue, M. M.; Roach, B. J.; Downs, J. J.; Blevins, T.; Baldea, M.; Eldridge, R. B. "Dividing Wall Column Control: Common Practices and Key Findings," *Chemical Engineering and Processing: Process Intensification* **2016**, 107, 106-115. <http://dx.doi.org/10.1016/j.cep.2016.05.013>
34. Kumar, A.; Baldea, M.; Edgar, T. F. "On Optimal Sensing and Actuation Design for an Industrial Scale Steam Methane Reformer Furnace," *AIChE Journal* **2016**, 62(9), 3225-3237. <http://dx.doi.org/10.1002/aic.15333>
35. Touretzky, C. R.; McGuffin, D. L.; Ziesmer, J. C.; Baldea, M. "The Effect of Distributed Electricity Generation Using Natural Gas on the Electric and Natural Gas Grids," *Applied Energy* **2016**, 177, 500-514. <http://dx.doi.org/10.1016/j.apenergy.2016.05.098>
36. Kumar, A.; Baldea, M.; Edgar, T. F. "Real-time Optimization of an Industrial Steam-methane Reformer under Distributed Sensing," *Control Engineering Practice* **2016**, 54, 140-153. <http://dx.doi.org/10.1016/j.conengprac.2016.05.010>

37. Perez, K. X.; Baldea, M.; Edgar, T. F. "Integrated HVAC Management and Optimal Scheduling of Smart Appliances for Community Peak Load Reduction," *Energy and Buildings* **2016**, *123*, 34-40. <http://dx.doi.org/10.1016/j.enbuild.2016.04.003>
38. Pattison, R. C.; Touretzky, C. R.; Johansson, T.; Baldea, M.; Harjunoski, I. "Optimal Process Operations in Fast-changing Electricity Markets: Framework for Scheduling with Low-order Dynamic Models and an Air Separation Application," *Industrial & Engineering Chemistry Research* **2016**, *55*, 4562-4584. <http://dx.doi.org/10.1021/acs.iecr.5b03499>
39. Piñeros, W. D.; Baldea, M.; Truskett, T. M. "Breadth Versus Depth: Interactions That Stabilize Particle Assemblies to Changes in Density or Temperature," *Journal of Chemical Physics* **2016**, *144*, 084502. <http://dx.doi.org/10.1063/1.4942117>
40. Xu, S.; Edgar, T. F.; Baldea, M.; Wojsznis, W.; Nixon, M.; Blevins, T. "Root Cause Diagnosis of Plant-wide Oscillations Based on Information Transfer in the Frequency Domain," *Industrial & Engineering Chemistry Research* **2016**, *55*(6), 1623-1629. <http://dx.doi.org/10.1021/acs.iecr.5b03068>
41. Pattison, R. C.; Gupta, A. M.; Baldea, M. "Equation-oriented Optimization of Process Flowsheets with Dividing-wall Columns," *AIChE Journal* **2015**, *62*, 704-716. <http://dx.doi.org/10.1002/aic.15060>
42. Touretzky, C. R.; Baldea, M. "A Hierarchical Scheduling and Control Strategy for Thermal Energy Storage Systems," *Energy and Buildings* **2016**, *110*, 94-107. <http://dx.doi.org/10.1016/j.enbuild.2015.09.049>
43. Wang, R. C.; Edgar, T. F.; Baldea, M.; Wojsznis, W.; Nixon, M.; Dunia, R. "Process Fault Detection Using Time-explicit Kiviat Diagrams," *AIChE Journal* **2015**, *61*(12), 4277-4293. <https://doi.org/10.1002/aic.15054>
44. Baldea, M.; Du, J.; Park, J.; Harjunoski, I. "Integrated Production Scheduling and Model Predictive Control of Continuous Processes," *AIChE Journal* **2015**, *61*(12), 4179-4190. <http://dx.doi.org/10.1002/aic.14951>
45. Ondeck, A. D.; Edgar, T. F.; Baldea, M. "Optimal Operation of a Residential District-level Combined Photovoltaic/Natural Gas Power and Cooling System," *Applied Energy* **2015**, *156*, 593-606, 2015 <http://dx.doi.org/10.1016/j.apenergy.2015.06.045>
46. Xu, S.; Lu, B.; Baldea, M.; Edgar, T. F.; Wojsznis, W.; Blevins, T.; Nixon, M. "Data Cleaning in the Process Industries," *Reviews in Chemical Engineering* **2015**, *31* (5), 453-490. <http://dx.doi.org/10.1515/revce-2015-0022>
47. Pattison, R. C.; Donahue, M. M.; Gupta, A.; Baldea, M. "Localized Temperature Control in Microchannel Reactors Using Bimetallic Thermally-actuated Valves," *Industrial & Engineering Chemistry Research* **2015**, *54*(24), 6355-6361. <http://dx.doi.org/10.1021/acs.iecr.5b00885>
48. Cao, Y.; Swartz, C. L. E.; Baldea, M.; Blouin, S. "Optimization-based Assessment of Design Limitations to Air Separation Plant Agility in Demand Response Scenarios," *Journal of Process Control* **2015**, *33*, 37-48. <http://dx.doi.org/10.1016/j.jprocont.2015.05.002>
49. Du, J.; Park, J.; Harjunoski, I.; Baldea, M. "A Time Scale-bridging Approach for Integrating Production Scheduling and Process Control," *Computers & Chemical Engineering* **2015**, *79*, 59-69. <http://dx.doi.org/10.1016/j.compchemeng.2015.04.026>

50. Baldea, M. "From Process Integration to Process Intensification," *Computers & Chemical Engineering* **2015**, *81*, 104-114.
<http://dx.doi.org/10.1016/j.compchemeng.2015.03.011>
51. Pattison, R. C.; Baldea, M. "Robust Autothermal Microchannel Reactors," *Computers & Chemical Engineering* **2015**, *81*, 171-179.
<http://dx.doi.org/10.1016/j.compchemeng.2015.03.013>
52. Pattison, R. C.; Baldea, M. "Multistream Heat Exchangers: Equation-oriented Modeling and Flowsheet Optimization," *AIChE Journal* **2015**, *61*(6), 1856-1866.
<http://dx.doi.org/10.1002/aic.14766>
53. Kumar, A.; Baldea, M.; Edgar, T. F.; Ezekoye, O. A. "Smart Manufacturing Approach for Efficient Operation of Industrial Steam-methane Reformers," *Industrial & Engineering Chemistry Research* **2015**, *54*(16), 4360-4370.
<http://dx.doi.org/10.1021/ie504087z> *featured as ACS Editors' Choice article on January 12, 2015
54. Xu, X.; Baldea, M.; Edgar, T. F.; Wojsznis, W.; Blevins, T.; Nixon, M. "An Improved Methodology for Outlier Detection in Dynamic Data Sets," *AIChE Journal* **2014**, *61*(2), 419-433. <http://dx.doi.org/10.1002/aic.14631>
55. Baldea, M.; Harjunkoski, I. "Integrated Production Scheduling and Process Control: A Systematic Review," *Computers & Chemical Engineering* **2014**, *71*, 377-390.
<http://dx.doi.org/10.1016/j.compchemeng.2014.09.002>
56. Pattison, R. C.; Baldea, M. "Equation-oriented Flowsheet Simulation and Optimization Using Pseudo-transient Models," *AIChE Journal* **2014**, *60*, 4104-4123.
<http://dx.doi.org/10.1002/aic.14567>