

# Curriculum Vitae

## Masoud Soroush

### 1 Positions

- **Professor** 2002–present  
Department of Chemical and Biological Engineering  
Drexel University  
Philadelphia, PA
- **Academic Advisor** 2011–Present  
Near-Miss Management LLC  
Philadelphia, PA
- **Visiting Professor** 1/2008–9/2008  
Department of Chemical Engineering  
Princeton University  
Princeton, NJ
- **Visiting Scientist** 2002–2003  
Marshall Laboratory  
DuPont  
Philadelphia, PA
- **Associate Professor** 1998–2002  
Department of Chemical Engineering  
Drexel University  
Philadelphia, PA
- **Assistant Professor** 1993–1998  
Department of Chemical Engineering  
Drexel University  
Philadelphia, PA
- **Postdoctoral Research Associate** 1992–1993  
Department of Chemical Engineering  
University of Michigan  
Ann Arbor, MI

## 2 Education

- **Ph.D., Chemical Engineering** 1992  
University of Michigan, Ann Arbor, MI
- **M.S.E., Electrical Engineering: Systems** 1991  
University of Michigan, Ann Arbor, MI
- **M.S.E., Chemical Engineering** 1988  
University of Michigan, Ann Arbor, MI
- **B.S., Chemical Engineering** 1985  
Abadan Institute of Technology, Iran

## 3 Honors and Awards

- National Science Foundation Faculty Early CAREER Award, 1997
- The O. Hugo Schuck Best Paper Award, American Automatic Control Council, 1999 (with S. Tatiraju and R. Mutharasan)
- Journal articles [3, 4, 6] (listed in Section 6.3 of this CV) were included in the AIChE Journal Process Systems Engineering Virtual Issue (Edited by Ignacio Grossmann and George Stephanopoulos) of Highly Cited Papers for the Period 1955-2011, 2011
- 2016 Chemical & Biological Engineering Department Outstanding Research Award, Drexel University
- AIChE J. Editor's Choice Article [Mohseni Ahooyi, T., J.E. Arbogast, W.D. Seider, U.G. Oktem, and M. Soroush, "Model-Predictive Safety System for Proactive Detection of Operation Hazards," *AIChE J.*, **62**, 2024–2042 (2016)]
- 2016 Industrial & Engineering Chemistry Research Excellence in Review Award
- Fellow of the American Institute of Chemical Engineers
- Faculty Achievement Award for Excellence in Teaching, Drexel University, 1999
- Best Presentation Award, American Control Conference, 2012
- Best Presentation Award, American Control Conference, 2006
- Best Presentation Award, American Control Conference, 1998
- CAST Director's Award for Work Presented at the 2001 American Institute of Chemical Engineers, Reno, NV, 2001 (with N. Zambare and M.C. Grady)
- Drexel-University Nominee for the Presidential Faculty Fellow Award, 1995
- Research Initiation Award, Petroleum Research Fund–American Chemical Society, 1994

- Rackham Graduate School Predoctoral Fellowship (through university-wide competition), University of Michigan, Ann Arbor, MI, 1989

## 4 Research Experience

### 4.1 Polymers

- Polymer Engineering
  - Polymer Coatings and Resins
  - Polymer Reaction Engineering
  - Experimental and Theoretical Studies of Polymerization Reactions
  - Macroscopic Mechanistic Modeling of Polymerization Reactors
  - Polymerization Reactor Optimization and Control
- Theoretical Study of Polymerization Reactions Using First-Principles Density Functional Theory
  - Thermal Monomer Self-Initiation Reactions
  - Chain Transfer to Monomer, Solvent and Polymer Reactions
  - Backbiting and  $\beta$ -Scission Reactions
  - Thermal Solvent-Monomer Co-initiation Reactions
- High-Performance Polymer Membranes
  - Separation of Acidic Gases from Natural Gas
  - Water Purification and Desalination
  - Polymer Intrinsic Microporosity (PIM) Membranes
  - Molecular Design, Synthesis and Characterization of Novel Macro-monomers
  - Polymerization and Polymer Post-Modifications with Responsive Groups and Nanoparticles
  - Membrane Fabrication, Characterization and Separation-Performance Testing

### 4.2 Power Storage and Renewable Power Generation Systems

- Multiscale Modeling of Fuel Cells, Solar Cells, Supercapacitors, Rechargeable Batteries and Flow Batteries
- Mathematical Modeling, Systems Analysis, Optimization, Estimation, Control and Integration
- Energy Materials Design and Study Using Density Functional Theory (DFT) and Time-Dependent DFT
- State and Parameter Estimation; Estimation of Rechargeable Battery State of Health and State of Charge

- Optimal Operation and Integration to Maximize Energy-Conversion Efficiency and Life of the Systems
- Optimal Recharging Policies for Rechargeable Batteries

### **4.3 Computer-Based Process Safety Systems**

- Probabilistic Fault Detection and Identification, and Risk Prediction
  - Probabilistic Mathematical Modeling
  - Probabilistic Prediction and Inference in Large-Scale Systems
  - Optimal Detection Strategies
  - Prediction of Rare Events
  - Alarm Management
- Model-Predictive Safety Systems
  - Predictive Detection of Operation Hazards
  - Predictive Alarms
  - Alarm Signals that Account for Process Nonlinearities and Variable Interactions
  - Proactive and Predictive (Prescriptive) Process Safety Systems

### **4.4 Scalable Statistical Machine Learning Methods for Big Data Analytics, with Application to Smart Manufacturing**

- Efficient Big Data Analytics, Mathematical Representation, and Statistical Inference
- Scalable Methods for Discovering Directed Causal Structures from Big Data
- Scalable Statistical Clustering Methods
- Flexible Statistical Classification Methods
- Scalable Methods of Forward and Backward Inference
- Application to Smart Manufacturing

### **4.5 Process Systems Engineering**

- Nonlinear Model-Based Control: Model Predictive Control and Differential Geometric Control
- Optimal Control; Real-Time Optimization; Multi-Objective Optimization
- Adaptive Control
- Nonlinear State and Parameter Estimation
- Multiscale Modeling: Electronic- to Macroscopic-Level Mathematical Modeling
- Probabilistic Modeling, Prediction and Inference

## 5 Industrial Research Collaborations with

- DuPont (Experimental Station and Marshall Laboratory), 1997–2011
- Axalta (Experimental Station), 2011–Present
- Air Liquid (Newark, DE), 2010–Present

## 6 Publications

### 6.1 Books

6. Soroush, M. (editor), *Insights into Polymerization Reactions from Computational Quantum Chemistry*, Elsevier, New York, NY, in press (2018)
5. Soroush, M., and K.K.H. Lau (editors), *Mathematical Modeling, Design and Optimization of Dye Sensitized Solar Cells*, Elsevier, New York, NY, in press (2018)
4. Soroush, M., *Nonlinear Model-Based Control*, in preparation (2019)
3. Soroush, M. *Process Modeling*, in preparation (2019)
2. Soroush, M. (editor), *Polymerization Reactor Modeling, Design and Monitoring*, MDPI, Basel (2016)
1. Soroush, M. *Studies in Nonlinear Control and Optimal Design with Experimental Application to Polymerization Reactors*, Volumes I and II, Ph.D. Thesis, University of Michigan, Ann Arbor, MI (1992)

### 6.2 Chapters in Books

10. Arabi Shamsabadi, A., N. Moghadam, P. Corcoran, S. Srinivasan, M.C. Grady, A.M. Rappe, and M. Soroush, “Study of n-Butyl Acrylate Self-Initiation Reaction Experimentally and via Macroscopic Mechanistic Modeling,” in *Polymerization Reactor Modeling, Design and Monitoring*, Ed. M. Soroush, MDPI, Basel (2016)
9. Seider, W.D., A. Pariyani, U. G. Oktem, I. Moskowitz, J.E. Arbogast, and M. Soroush, “Introduction to Dynamic Risk Analyses,” in *Methods in Chemical Process Safety*, Ed. F. Khan, Elsevier, New York, NY (2017)
8. Ogunnaike, B., G. Francois, M. Soroush, and D. Bonvin, “Control of Polymerization Processes,” Chapter 12 in *The Control Handbook*, 2nd Edition, Ed. William Levine, CRC Press, Boca Raton, FL (2010)
7. Soroush, M., and P. Daoutidis “Optimal Directionality and Windup Compensation in Input-Constrained Nonlinear Systems,” in *Actuator Saturation Control*, V. Kapila and K. M. Grigoriadis (eds.), Control Engineering Series, Marcel Dekker, Inc., 227–244 (2002)
6. Doyle III, F. J., M. Soroush, and C. Cordeiro, “Control of Product Quality in Polymerization Processes,” in *Chemical Process Control–VI*, J. B. Rawlings, B. A. Ogunnaike and J. W. Eaton (eds.), AIChE Symposium Series, **98(326)**, CACHE, 290–306 (2002)

5. Kanter, J. M., M. Soroush, and W. D. Seider, “Feedback Control of Stable, Non-minimum-phase, Nonlinear Processes,” in *Chemical Process Control–VI*, J. B. Rawlings, B. A. Ogunnaike and J. W. Eaton (eds.), AIChE Symposium Series, **98(326)**, CACHE, 389–392 (2002)
4. Soroush, M., and H. M. Soroush, “Long-Prediction-Horizon Nonlinear Model Predictive Control,” in *Nonlinear Predictive Control: Theory and Practice*, B. Kouvaritakis and M. Cannon (eds.), IEE Control Engineering Book Series, **61**, 190–201 (2001)
3. Soroush, M., and K. Muske, “Analytical Model Predictive Control,” in *Nonlinear Model Predictive Control*, F. Allgower and A. Zheng (eds.), Progress in Systems and Control Theory series, Vol. 26, Birkhauser-Verlag, Birkhauser Verlag, Basel, 163–179 (2000)
2. Soroush, M., “Directionality and Windup Compensation in Nonlinear Model-Based Control,” in *Nonlinear Model-Based Process Control*, R. Berber and C. Kravaris (eds.), NATO ASI Series, Kluwer Academic Publishers, Dordrecht, 173–208 (1998)
1. Nikravesh, M., M. Soroush, A. R. Kovscek, and T. W. Patzek, “Identification and Control of Industrial-Scale Processes via Neural Networks,” in *Chemical Process Control-V*, J.C. Kantor, C.E. Garcia, and B. Carnahan (eds.), AIChE Symposium Series, **93(316)**, 284–287 (1997)

## 6.3 Refereed Journal Articles

### I. Polymers

103. Arabi Shamsabadi, A., F. Seidi, M. Nozari, and M. Soroush, “A New Pentiptycene-Based Dianhydride and its High-Free-Volume Polymer for CO<sub>2</sub> Removal,” *ChemSusChem*, DOI: 10.1002/cssc.201701491 (2017)
102. Zirehpour, A., A. Rahimpour, A. Arabi Shamsabadi, and M. Soroush, “Mitigation of TFC-Membrane Biofouling via Immobilizing Nano-Sized Biocidal Reservoirs in the Membrane Active Layer,” *ACS Environmental Sci. & Tech.*, **51(10)**, 5511–5522 (2017)
101. Arabi Shamsabadi, A., F. Seidi, E. Salehi, M. Nozari, A. Rahimpour, and M. Soroush, “Efficient CO<sub>2</sub>-Removal Using Novel Mixed-Matrix Membranes with Modified TiO<sub>2</sub> Nanoparticles,” *J. of Materials Chemistry A*, **5**, 4011–4025 (2017)
100. Mokhtari, S., A. Rahimpour, A. Arabi Shamsabadi, S. Habibzadeh, and M. Soroush, “Enhancing Performance and Surface Antifouling Properties of Polysulfone Ultrafiltration Membranes with Salicylate-Alumoxane Nanoparticles,” *Applied Surface Sci.*, **393**, 93–102 (2017)
99. Nozari, M., J. P. Jasinski, M. Kaur, A.W. Addison, A. Arabi Shamsabadi, and M. Soroush, “Crystal structure of 5,7,12,14-tetrahydro-5,14:7,12-bis([1,2]benzeno)pentacene-6,13-dione,” *Acta Crystallogr. B*, **72(12)**, 1734–1738, <https://doi.org/10.1107/S2056989016017461> (2016)
98. Nozari, M., M. Kaur, J.P. Jasinski, A.W. Addison, A.A. Shamsabadi, and M. Soroush, “5,7,12,14-Tetrahydro-5,14:7,12-bis([1,2]benzeno)pentacene-6,13-diol Dimethylformamide Disolvate,” *IUCrData*, **1(7)**, TA-MN1627AR.cif1, <http://dx.doi.org/10.1107/S241431461601130> (2016)

97. Arabi Shamsabadi, A., Moghadam, N., P. Corcoran, S. Srinivasan, M.C. Grady, A.M. Rappe, and M. Soroush, "Study of n-Butyl Acrylate Self-Initiation Reaction Experimentally and via Macroscopic Mechanistic Modeling," *Processes*, **4(2)**, 15; doi:10.3390/pr4020015 (2016)
96. Arabi Shamsabadi, A., R. Mosayyebi Behbahani, F. Seidi, and M. Soroush, "Physical Aging of Polyetherimide Membranes," *J. of Natural Gas Sci. and Eng.*, **27(2)**, 651–660 (2015)
95. Moghadam, N., S. Liu, S. Srinivasan, M.C. Grady, A.M. Rappe, and M. Soroush, "Theoretical Study of Intermolecular Chain Transfer to Polymer Reactions of Alkyl Acrylates," *Ind. & Engineering Chem. Research*, **54(16)**, 4148–4165 (2015)
94. Liu, S., S. Srinivasan, J. Tao, M.C. Grady, M. Soroush, and A.M. Rappe, "Modeling Spin-Forbidden Monomer Self-initiation Reactions in Free-Radical Polymerization of Acrylates and Methacrylates," *J. of Physical Chem. A*, **118(40)**, 9310–9318 (2014)
93. Liu, S., S. Srinivasan, M.C. Grady, M. Soroush, and A.M. Rappe, "Backbiting and  $\beta$ -Scission Reactions in Free-Radical Polymerization of Methyl Acrylate," *Int. J. of Quantum Chemistry*, **114(5)**, 345–360 (2014)
92. Moghadam, N., S. Srinivasan, M.C. Grady, A.M. Rappe, and M. Soroush, "Theoretical Study of Chain Transfer to Solvent Reactions of Alkyl Acrylates," *J. of Physical Chem. A*, **118 (29)**, 5474–5487 (2014)
91. Moghadam, N., S. Liu, S. Srinivasan, M.C. Grady, M. Soroush, and A.M. Rappe, "Computational Study of Chain Transfer to Monomer Reactions in Thermal Polymerization of Alkyl Acrylates," *J. of Physical Chem. A*, **117**, 2605–2618 (2013)
90. Liu, S., S. Srinivasan, M.C. Grady, M. Soroush, and A.M. Rappe, "Computational Study of Cyclohexanone-Monomer Co-initiation Mechanism in Thermal Polymerization of Methyl Acrylate and Methyl Methacrylate," *J. of Physical Chem. A*, **116(22)**, 5337–5348 (2012)
89. Srinivasan, S., M. W. Lee, M. C. Grady, M. Soroush, and A. M. Rappe, "Computational Evidence for Self-Initiation in Spontaneous High-Temperature Polymerization of Methyl Methacrylate," *J. of Physical Chemistry A*, **115(6)**, 1125–1132 (2011)
88. Srinivasan, S., M. W. Lee, M. C. Grady, M. Soroush, and A. M. Rappe, "Computational Study of Self-Initiation Mechanism in Thermal Polymerization of Ethyl and n-Butyl Acrylates," *J. of Physical Chemistry A*, **114(30)**, 7975–7983 (2010)
87. Srinivasan, S., G.A. Kalfas, V.I. Petkovska, C. Bruni, M.C. Grady, and M. Soroush, "Experimental Study of Spontaneous Thermal Homo-Polymerization of Methyl and n-Butyl Acrylate," *J. of Applied Polymer Science*, **118(4)**, 1898–1909 (2010)
86. Soroush, M., M.C. Grady, and G.A. Kalfas, "Free-Radical Polymerization at Higher Temperatures: Systems Impacts of Secondary Reactions," *Comput. & Chemical Eng.*, **32**, 2155–2167 (2008)
85. Rantow, F., M. Soroush, and M. C. Grady, "A Reduced-Order Polymerization Kinetic Model for Multirate Monitoring of Spectroscopic and Chromatographic Data," *Journal of Chemometrics*, **21(12)**, 612–620 (2007)

84. Srinivasan, S., M. W. Lee, M. C. Grady, M. Soroush, and A. M. Rappe, “Computational Study of Self-Initiation Mechanism in Thermal Polymerization of Methyl Acrylate,” *J. of Physical Chemistry A*, **113(40)**, 10787–10794 (2009)
83. Rantow, F., M. Soroush, M.C. Grady, and G.A. Kalfas, “Spontaneous Polymerization and Chain Microstructure Evolution in High-Temperature Solution Polymerization of n-Butyl Acrylate,” *Polymer*, **47(4)**, 1423–1435 (2006)
82. Quan, C., M. Soroush, M.C. Grady, J.E. Hansen, and W. Simonsick, “High Temperature Homo-Polymerization of Ethyl Acrylate and n-Butyl Acrylate: Polymer Characterization,” *Macromolecules*, **38(18)**, 7619–7628 (2005)

## II. Power Storage and Renewable Power Generation Systems

81. Smolin, Y.Y., M. Soroush, and K.K. S. Lau, “Oxidative Chemical Vapor Deposition of Polyaniline Thin Films,” *Beilstein Journal of Nanotechnology*, **8**, 1266–1276 (2017)
80. Smolin, Y.Y., M. Soroush, and K.K.H. Lau, “Influence of oCVD Polyaniline Film Chemistry in Carbon-Based Supercapacitors,” *Ind. & Eng. Chem. Research*, **56(21)**, 6221–6228 (2017)
79. Smolin, Y.Y., K.L. Van Aken, M. Boota, M. Soroush, Y. Gogotsi, and K.K.H. Lau, “Engineering Ultrathin Polyaniline in Micro/Mesoporous Carbon Supercapacitor Electrodes using Oxidative Chemical Vapor Deposition,” *Advanced Materials Interfaces*, **4(8)**, 1601201 (2017)
78. Johnson, N.M., Y.Y. Smolin, D. Hagaman, M. Soroush, K.K.S. Lau, and H.-F. Ji, “Suitability of N-Propanoic Acid Spiropyran and Spirooxazines for Use as Sensitizing Dyes in Dye-Sensitized Solar Cells,” *J. of Physical Chemistry Chemical Physics*, **19**, 2981–2989 (2017)
77. Smolin, Y.Y., S. Janakiraman, M. Soroush, and K.K.H. Lau, “Experimental and Theoretical Investigation of Dye Sensitized Solar Cells Integrated with Crosslinked Poly(vinylpyrrolidone) Polymer Electrolyte Using Initiated Chemical Vapor Deposition,” *Thin Solid Film*, **635**, 9–16 (2016)
76. Kuba, A. G., Y.Y. Smolin, M. Soroush, and K.K.S. Lau, “Synthesis and Integration of Poly(1-Vinylimidazole) Polymer Electrolyte in Dye Sensitized Solar Cells by Initiated Chemical Vapor Deposition,” *Chem. Engin. Sci.*, **154**, 136–142 (2016)
75. Johnson, N., Y.Y. Smolin, C. Shindler, D. Hagamana, M. Soroush, K.K.S. Lau, and H.-F. Ji, “Photochromic Dye-Sensitized Solar Cells,” *AIMS Materials Sci.*, **2(4)**, 503–509 (2015)
74. Janakiraman, S., S.L. Farrell, C.-Y. Hsieh, Y.Y. Smolin, M. Soroush, and K.K.S. Lau, “Kinetic Analysis of the Initiated Chemical Vapor Deposition of Poly(vinyl pyrrolidone) and Poly(4-vinylpyridine),” *Thin Solid Films*, **595(B)** 244–250 (2015)
73. Smolin, Y.Y., S. Nejati, M. Bavarian, D. Lee, K.K.S. Lau, and M. Soroush, “Effects of Polymer Chemistry on Polymer-Electrolyte Dye Sensitized Solar Cell Performance: a Theoretical and Experimental Investigation,” *J. of Power Sources*, **274**, 156–164 (2015)



72. Bavarian, M., S. Najati, D. Lee, K.K.H. Lau, and M. Soroush, “Theoretical and Experimental Study of a Dye Sensitized Solar Cell,” *Industrial & Eng. Chem. Research*, **53 (13)**, 5234–5247 (2014)
71. Bavarian, M., I.G. Kevrekidis, J.B. Benziger, and M. Soroush, “Modeling and Bifurcation Analysis of a Coionic Conducting Solid Oxide Fuel Cell,” *Ind. & Eng. Chem. Research*, **52(9)**, 3165–3177 (2013)
70. Hajimolana, S.A., M.A. Hussain, M. Soroush, W.M.A. Wan Daud, and M. Chakrabarti, “Multi-Linear-Model Predictive Control of a Tubular Solid Oxide Fuel Cell System,” *Ind. & Eng. Chem. Research*, **52 (1)**, 430–441 (2013)
69. Soroush, M. and D. Chmielewski, “Process Systems Opportunities in Power Generation, Storage and Distribution,” *Computers & Chem. Eng.*, **5(5)**, 86–95 (2013)
68. Bavarian, M., and M. Soroush, “Mathematical Modeling and Steady-State Analysis of a Proton-Conducting Solid Oxide Fuel Cell,” *J. of Process Control*, **22(8)** 1521–1530 (2012)
67. Bavarian, M., and M. Soroush, “Steady-State Multiplicity in a Solid Oxide Fuel Cell: Practical Considerations,” *Chem. Eng. Sci.*, **67(1)**, 2–14 (2012)
66. Hajimolana, S.A., M.A. Hussain, M. Soroush, W.M.A. Wan Daud, and M.H. Chakrabarti, “Modeling of a Tubular-SOFC: The Effect of the Thermal Radiation of Fuel Components and CO Participating in the Electrochemical Process,” *Fuel Cells*, **12(5)**, 761–772 (2012)
65. Hajimolana, S.A., M.A. Hussain, W.M.A. Wan Daud, M. Soroush, and A. Shamiri, “Mathematical Modeling of Solid Oxide Fuel Cells: A Review,” *Renewable and Sustainable Energy Reviews*, **15(4)**, 1893–1917 (2011)
64. Bavarian, M., M. Soroush, I.B. Kevrekidis, and J.B. Benziger, “Mathematical Modeling, Steady-State and Dynamic Behavior, and Control of Fuel Cells: a Review,” *Ind. & Eng. Chem. Research*, **49(17)**, 7922–7950 (2010)
63. Hajimolana, S.A., and M. Soroush, “Dynamics and Control of a Tubular Solid-Oxide Fuel Cell,” *Ind. & Eng. Chem. Research*, **48**, 6112–6125 (2009)

### III. Computer-Based Process Safety Systems

62. Mohseni Ahooyi, T., J.E. Arbogast, W.D. Seider, U.G. Oktem, and M. Soroush, “Model-Predictive Safety System for Proactive Detection of Operation Hazards,” *AIChE J.*, **62**, 2024–2042 (2016)
61. Moskowitz, I.H., W.D. Seider, J.E. Arbogast, U. G. Oktem, and M. Soroush, “Improved Predictions of Alarm and Safety System Performance Through Process and Operator Response-Time Modeling,” *AIChE J.*, **62**, 3461–3472 (2016)
60. Moskowitz, I., W. Seider, M. Soroush, U. Oktem, and J.E. Arbogast, “Chemical Process Simulation for Dynamic Risk Analysis: a Steam-Methane Reformer Case Study,” *Ind. & Eng. Chem. Research*, **54(16)**, 4347–4359 (2015)
59. Oktem, U.G., W.D. Seider, M. Soroush, and A. Pariyani, “Improve Process Safety with Near-Miss Analysis,” *Chem. Eng. Progress*, **109(5)**, 20–27, May (2013)

58. Pariyani, A., W. D. Seider, U. G. Oktem, and M. Soroush, “Incidents Investigation and Dynamic Analysis of Large Databases in Chemical Plants: An FCCU Case Study,” *Ind. & Eng. Chem. Research*, **49**, 8062–8079 (2010)
57. Meel, A., W. D. Seider, and M. Soroush, “A Game Theoretic Approach to Multi-Objective Process Designs: Focus on Inherent Safety,” *AIChE J.*, **52(1)**, 228–246 (2006)
56. Pariyani, A., W. D. Seider, U. G. Oktem, and M. Soroush, “Dynamic Risk Analysis Using Alarm Databases to Improve Process Safety and Product Quality: Part I–Data Compaction,” *AIChE J.*, **58(3)**, 812–825, (2012)
55. Pariyani, A., W. D. Seider, U. G. Oktem, and M. Soroush, “Dynamic Risk Analysis Using Alarm Databases to Improve Process Safety and Product Quality: Part II – Bayesian Analysis,” *AIChE J.*, **58(3)**, 826–841, (2012)

#### IV. Probabilistic Modeling, Inference, and Risk Assessment

54. Mohseni Ahooyi, T., J. E. Arbogast, and M. Soroush, “An Efficient Copula-Based Method of Identifying Regression Models of Non-Monotonic Relationships,” *Chem. Eng. Sci.*, **136(2)**, 106–114 (2015)
53. Mohseni Ahooyi, T., J.E. Arbogast, and M. Soroush, “Applications of the Rolling Pin Method: 1. an Efficient Alternative to Bayesian Network Modeling and Inference,” *Ind. & Eng. Chem. Research*, **54(16)**, 4316–4325 (2015)
52. Mohseni Ahooyi, T., J.E. Arbogast, and M. Soroush, “Rolling Pin Method: Efficient General Method of Joint Probability Modeling,” *Ind. & Eng. Chem. Research*, **53(52)**, 20191–20203 (2014)
51. Mohseni Ahooyi, T., J.E. Arbogast, U. Oktem, W.D. Seider, and M. Soroush, “Estimation of Complete Discrete Multivariate Probability Distributions with Application to Risk Assessment and Fault Detection,” *Ind. & Eng. Chem. Research*, **53(18)**, 7538–7547 (2014)
50. Mohseni Ahooyi, T., J.E. Arbogast, U. Oktem, W.D. Seider, and M. Soroush, “Maximum-likelihood Maximum-Entropy Estimation of Multivariate Probability Density Functions,” *AIChE J.*, **60(3)**, 1013–1026 (2014)
49. Mehranbod, N., C. Panjapornpon, and M. Soroush, “A Method of Sensor Fault Detection and Identification,” *J. of Process Contr.*, **15(3)**, 321–339 (2005)
48. Mehranbod, N., M. Soroush, M. Piovoso, and B. A. Ogunnaike, “A Probabilistic Model for Sensor Fault Detection and Identification,” *AIChE J.*, **49(7)**, 1787–1802 (2003)

#### V. Process Systems Engineering

47. Garriga, J.L., H.M. Soroush, and M. Soroush, “On the Effects of Tunable Parameters of Model Predictive Control on the Locations of Closed-Loop Eigenvalues,” *Ind. & Eng. Chem. Research*, **49(17)**, 7951–7956 (2010)
46. Garriga, J.L., and M. Soroush, “Model Predictive Control Tuning Methods: A Review,” *Ind. & Eng. Chem. Research*, **49(8)**, 3505–3515 (2010)

45. Panjapornpon, C., M. Soroush, and W.D. Seider, “Differential-Geometric Model-Based Control (DGMBC): A Software Package for Controller Design,” *Comput. & Chemical Eng.*, **32(7)**, 1569–1588 (2008)
44. Panjapornpon, C., and M. Soroush, “Shortest-Prediction-Horizon Nonlinear Model Predictive Control with Guaranteed Asymptotic Stability,” *International J. of Contr.*, **80(10)**, 1533–1543 (2007)
43. Panjapornpon, C., and M. Soroush, “On-Line Parameter Estimation through Dynamic Inversion: a Real-Time Study,” *Ind. & Eng. Chem. Research*, **46**, 2503–2507 (2007)
42. Soroush, M., F. S. Rantow, and Y. Dimitratos, “Control Quality Loss in Analytical Control of Input-Constrained Systems,” *Ind. & Eng. Chem. Research*, **45**, 8528–8538 (2006)
41. Panjapornpon, C., M. Soroush, and W. D. Seider, “Model-Based Controller Design for Unstable, Non-Minimum-Phase, Nonlinear Processes,” *Ind. & Eng. Chem. Research*, **45**, 2758–2768 (2006)
40. Soroush, M., N. Mehranbod, and S. Valluri, “Nonlinear Control of Input-Constrained Systems,” *Comput. & Chem. Eng.*, **30(1)**, 158–181 (2005)
39. Valluri, S., and M. Soroush, “A Nonlinear Controller Design Method for Processes with Actuator Saturation Nonlinearities,” *Inter. J. of Control*, **76(7)**, 698–716 (2003)
38. Zambare, N., M. Soroush, and B. A. Ogunnaike, “A Method of Robust Multi-Rate State Estimation,” *J. of Process Contr.*, **13(4)**, 337–355 (2003)
37. Zambare, N., M. Soroush, and M. Grady, “Real-time Multi-rate Nonlinear Estimation in a Polymerization Reactor,” *AIChE J.*, **48(5)**, 1022–1033 (2002)
36. Soroush, M., and N. Mehranbod, “Optimal Compensation for Directionality in Processes with a Saturating Actuator,” *Comput. & Chem. Eng.*, **26(11)**, 1633–1641 (2002)
35. Kanter, J. M., M. Soroush, and W. D. Seider, “Real-time Nonlinear Control of a Multivariable Non-minimum-phase Process,” *AIChE J.*, **48(10)**, 2247–2254 (2002)
34. Kanter, J. M., M. Soroush, and W. D. Seider, “Nonlinear Controller Design for Input-Constrained, Multivariable Processes,” *Ind. & Eng. Chem. Research*, **41**, 3735–3744 (2002)
33. Kanter, J. M., M. Soroush, and W. D. Seider, “Nonlinear Feedback Control of Multivariable Non-minimum-phase Processes,” *J. of Process Contr.*, **12(6)**, 667–686 (2002)
32. Kanter, J. M., M. Soroush, and W. D. Seider, “Continuous-time, Nonlinear Feedback Control of Stable Processes,” *Ind. & Eng. Chem. Research*, **40(9)**, 2069–2078 (2001)
31. Soroush, M., and N. Zambare, “Nonlinear Output Feedback Control of a Class of Polymerization Reactors,” *IEEE Trans. Contr. Systems Tech.*, **8(2)**, 310–320 (2000)
30. Tyner, D., M. Soroush, and M. Grady, “Adaptive Temperature Control of Multi-Product Jacketed Reactors,” *Ind. & Eng. Chem. Research*, **38(11)**, 4337–4344 (1999)

29. Soroush, M., and S. Valluri, “Optimal Directionality Compensation in Processes with Input Saturation Nonlinearities,” *International J. of Contr.*, **72(17)**, 1555–1564 (1999)
28. Tatiraju, S., M. Soroush, and B. A. Ogunnaike, “Multi-Rate Nonlinear State Estimation with Application to a Polymerization Reactor,” *AIChE J.*, **45(4)**, 769–780 (1999)
27. Tatiraju, S., M. Soroush, and R. Mutharasan, “Multi-Rate State and Parameter Estimation in a Biochemical Reactor,” *Biotech. & Bioeng.*, **63(1)**, 22–32 (1999)
26. Soroush, M., “State and Parameter Estimations and their Applications in Process Control,” *Computers Chem. Eng.*, **23**, 229–245 (1998)
25. Tatiraju, S., and M. Soroush, “Parameter Estimator Design with Application to a Reactor,” *Ind. & Eng. Chem. Research*, **37(2)**, 455–465 (1998)
24. Soroush, M., and S. Valluri, “Multivariable Nonlinear Controller Synthesis in Discrete-Time,” *Computers & Chem. Eng.*, **22(7–8)**, 1065–1088 (1998)
23. Grantz, J., S. Valluri, and M. Soroush, “Discrete-Time Nonlinear Control of Processes with Actuator Saturation Nonlinearities,” *AIChE J.*, **44(7)**, 1701–1705 (1998)
22. Valluri, S., M. Soroush, and M. Nikraves, “Shortest-Prediction-Horizon Nonlinear Model Predictive Control,” *Chem. Eng. Sci.*, **53(2)**, 273–292 (1998)
21. Valluri, S., and M. Soroush, “Analytical Control of SISO Nonlinear Processes with Input Constraints,” *AIChE J.*, **44(1)**, 116–130 (1998)
20. Tatiraju, S., and M. Soroush, “Nonlinear State-Estimation in a Polymerization Reactor,” *Ind. & Eng. Chem. Research*, **36(7)**, 2679–2690 (1997)
19. Soroush, M., “Nonlinear State-Observer Design with Application to Reactors,” *Chem. Eng. Sci.*, **52(3)**, 387–404 (1997)
18. Soroush, M., and H. M. Soroush, “Input-Output Linearizing Nonlinear Model Predictive Control,” *International J. of Contr.*, **68(6)**, 1449–1473 (1997)
17. Valluri, S., and M. Soroush, “Nonlinear State Estimation in the Presence of Multiple Steady States,” *Ind. & Eng. Chem. Research*, **35(8)**, 2645–2659 (1996)
16. Soroush, M., “Evaluation of Achievable Control Quality in Nonlinear Processes,” *Computers & Chem. Eng.*, **20(4)**, 357–364 (1996)
15. Soroush, M., and C. Kravaris, “MPC Formulation of GLC,” *AIChE J.*, **42(8)**, 2377–2381 (1996)
14. Soroush, M., and C. Kravaris, “Discrete-Time Nonlinear Feedback Control of Multivariable Processes,” *AIChE J.*, **42(1)**, 187–203 (1996)
13. Soroush, M., and C. Kravaris, “A Continuous-Time Formulation of Nonlinear Model Predictive Control,” *International J. of Contr.*, **63(1)**, 121–146 (1996)
12. Soroush, M., and C. Kravaris, “Nonlinear Control of a Polymerization CSTR with Singular Characteristic Matrix,” *AIChE J.*, **40(6)**, 980–990 (1994)

11. Soroush, M., and C. Kravaris, “Synthesis of Discrete-Time Feedforward/Feedback Control Systems for Nonlinear Processes,” *AIChE J.*, **40(3)**, 473–495 (1994)
10. Soroush, M., and C. Kravaris, “Multivariable Nonlinear Control of a Continuous Polymerization Reactor: an Experimental Study,” *AIChE J.*, **39(12)**, 1920–1937 (1993)
9. Soroush, M., and C. Kravaris, “Optimal Design and Operation of Batch Reactors: 1. Theoretical Framework,” *Ind. & Eng. Chem. Research*, **32(5)**, 866–881 (1993)
8. Soroush, M., and C. Kravaris, “Optimal Design and Operation of Batch Reactors: 2. Case Study,” *Ind. & Eng. Chem. Research*, **32(5)**, 882–893 (1993)
7. Soroush, M., and C. Kravaris, “Discrete-Time Nonlinear Controller Synthesis by Input/Output Linearization,” *AIChE J.*, **38(12)**, 1923–1945 (1992)
6. Soroush, M., and C. Kravaris, “Nonlinear Control of a Batch Polymerization Reactor: an Experimental Study,” *AIChE J.*, **38(9)**, 1429–1448 (1992)
5. Wright, R. A., M. Soroush, and C. Kravaris, “Strong Acid Equivalent Control of pH Processes: an Experimental Study,” *Ind. & Eng. Chem. Research*, **30(10)**, 2437–2444 (1991)
4. Daoutidis, P., M. Soroush, and C. Kravaris, “Feedforward/Feedback Control of Multivariable Nonlinear Processes,” *AIChE J.*, **36(10)**, 1471–1484 (1990)
3. Kravaris, C., and M. Soroush, “Synthesis of Multivariable Nonlinear Controllers by Input/Output Linearization,” *AIChE J.*, **36(2)**, 249–264 (1990)

## VI. Chemical Engineering Education

2. Soroush, M., and C. B. Weinberger, “Two Core Chemical Engineering Courses on Process Modeling,” *Chem. Eng. Education*, **44(1)**, 65–72 (2010)
1. Panjapornpon, C., N. Fletcher, and M. Soroush, “A Flexible Pilot-Scale Setup for Real-Time Studies in Process Systems Eng.,” *Chem. Eng. Education*, **40(1)**, 40–45 (2006)

## 6.4 Refereed Conference Proceedings Papers

56. Soroush, M., Y. Smolin, and K.K.L. Lau, “Multiscale Modeling for Optimal Design, Operation and Integration of Power Generation and Storage Systems,” *Proc. of 2017 Joint Foundations of Computer-Aided Process Operations (FOCAPO) / Chemical Process Control (CPC) XI*, Loews Ventana Canyon Hotel and Resort, Tucson, Arizona January 8-12, 2017.
55. Soroush, M., T. Mohseni Ahooyi, J.E. Arbogast, and W.D. Seider, “Model-Predictive Safety Systems for Predictive Detection of Operation Hazards: a New Paradigm in Process Safety,” *Proc. of 2017 Joint Foundations of Computer-Aided Process Operations (FOCAPO) / Chemical Process Control (CPC) XI*, Loews Ventana Canyon Hotel and Resort, Tucson, Arizona January 8-12, 2017.

54. Moskowitz, I., M. Soroush; J.E. Arbogast, U. Oktem, and W. Seider, “Evaluating Process Models for Use in Construction of Safety-System Failure Probability Distributions,” *Proc. of PSE2015 and ESCAPE2*, Copenhagen, Denmark (2015)
53. Seider, W.D., M. Soroush, J.E. Arbogast, and U.G. Oktem, “Design for Process Safety – A Perspective,” Mario Eden, John D. Sirola and Gavin P. Towler (Editors), *Proceedings of the 8th International Conference on Foundations of Computer-Aided Process Design – FOCAPD 2014*, July 13-17, 2014, Cle Elum, Washington (2014)
52. Bavarian, M., and M. Soroush, “Control of a Heat-Integrated Co-Ionic-Conducting Solid Oxide Fuel Cell System,” *Proc. of American Contr. Conf.*, Washington, DC, 5356–5361 (2013)
51. Bavarian, M., M. Soroush, I.G. Kevrekidis, J.B. Benziger, “Mathematical Modeling and Steady-State Analysis of a Co-Ionic-Conducting Solid Oxide Fuel Cell,” *Proc. of American Contr. Conf.*, Montreal, CANADA, 4269–4274 (2012)
50. Fan, Y., W.D. Seider, U.G. Oktem, A. Pariyani, M. Soroush, J.E. Arbogast, and D. Feather, “Risk Analysis Using Large Alarm Databases,” *Proc. of Joint Foundations of Computer-Aided Process Operations (FOCAPO) 2012 and Chemical Process Control (CPC) VIII* (2012), Savannah, GA (2012)
49. Soroush, M. and D. Chmielewski, “Process Systems Opportunities in Power Generation, Storage and Distribution,” *Proc. of Joint Foundations of Computer-Aided Process Operations (FOCAPO) 2012 and Chemical Process Control (CPC) VIII* (2012), Savannah, GA
48. Bavarian, M., and M. Soroush, “Steady State Multiplicity in a Solid-Oxide Fuel Cell,” *Proc. of American Contr. Conf.*, San Francisco, CA, 1506–1511 (2011)
47. Rier, T., S. Srinivasan, M. Soroush, G.A. Kalfas, M.C. Grady, and A.M. Rappe, “Macroscopic Mechanistic Modeling and Optimization of a Self-Initiated High-Temperature Polymerization Reactor,” *Proc. of American Contr. Conf.*, San Francisco, CA, 3071–3076 (2011)
46. Pariyani, A. (speaker), W.D. Seider, U. Oktem, and M. Soroush, “Alarm Management for Improved Process Safety, Reliability, and Product Quality,” *7th Global Congress on Process Safety*, (2010)
45. Pariyani A., W. Seider, U. Oktem, and M. Soroush, “Improving Process Safety and Product Quality Using Large Databases,” European Symposium on Computer Aided Process Engineering (ESCAPE) 20, Ischia, Naples, Italy, June 6–9 (2010)
44. Hajimolanaa, S.A., and M. Soroush, “Dynamic Behavior and Control of a Tubular Solid-Oxide Fuel Cell System,” *Proc. of American Contr. Conf.*, 2660–2665 (2009)
43. Sahraneshin, A., N. Mehranbod, R. Eslamlouian, and M. Soroush, “State and Parameter Estimation using Bayesian Belief Networks,” *Proc. of American Contr. Conf.*, 494–499 (2009)
42. Garriga, J. L., and M. Soroush, “Placement of Eigenvalues via Model Predictive Control,” *Proc. of American Contr. Conf.*, 429–434 (2008)

41. Soroush, M. “Plants for which Model Predictive Control Admits an Analytical Solution,” *Proc. of American Contr. Conf.*, 3745–3750 (2007)
40. Rantow, F., M. Soroush, and M. C. Grady, “Global Parametric Identifiability of Mechanistic Models in Chain Polymerization,” *Proc. of American Contr. Conf.*, 3068–6073 (2006)
39. Panjapornpon, C., and M. Soroush, “Control of Non-Minimum-Phase Nonlinear Systems through Constrained Input-Output Linearization,” *Proc. of American Contr. Conf.*, 4522–4527 (2006)
38. Panjapornpon, C., M. Soroush, and W. D. Seider, “Software for Analytical Nonlinear Controller Design,” *Proc. of American Contr. Conf.*, 4848–4853 (2006)
37. Grady, M.C., G.A. Kalfas, J.R. Richards, J.P. Congalidis, M. Soroush, F.S. Rantow, R.A. Hutchinson, and D. Li, “Higher Temperature Free-Radical Acrylic Polymerization - A More Complete Model of Acrylate and Methacrylate Co-Polymerization,” *Proc. of 7th World Congress of Chemical Engineering*, Glasgow, Scotland, July 10–14 (2005)
36. Rantow, F., M. Soroush, and M. C. Grady, “Optimal Control of a High-Temperature Semi-Batch Solution Polymerization Reactor,” *Proc. of American Contr. Conf.*, 3102–3107 (2005)
35. Soroush, M., and Y. Dimitratos, “Control System Selection: A Measure of Control Quality Loss in Analytical Control,” *7th International Symposium on Dynamics and Control Process Systems*, Boston, MA (2004)
34. Panjapornpon, C., M. Soroush, and W. D. Seider, “A Model-Based Control Method Applicable to Unstable, Non-Minimum-Phase, Nonlinear Processes,” *Proc. of American Contr. Conf.*, 2921–2924 (2004)
33. Rantow, F., M. Soroush, and M. C. Grady, “Resin Design and Optimization through Modeling and Optimization of High-Temperature (140–200°C) n-Butyl Acrylate Polymerization,” *Proc. of Foundations of Computer-Aided Process Design*, Princeton, NJ (2004)
32. Panjapornpon, C., M. Soroush, and W. D. Seider, “A Method of Controlling Unstable, Non-Minimum-Phase, Nonlinear Processes,” *Proc. of International Symposium on Advanced Control of Chemical Processes, Hong Kong, China*, (2004)
31. Panjapornpon, C., M. Soroush, and W. D. Seider, “Model-Based Control of Unstable, Non-Minimum-Phase, Nonlinear Processes,” *Proc. of IEEE Conference on Decision and Control*, Maui, Hawaii, 6151–6156 (2003)
30. Soroush, M., N. Mehranbod, and S. Valluri, “An Optimization Approach to Nonlinear Control of Input-Constrained Systems,” *Proc. of American Contr. Conf.*, 1218–1223 (2003)
29. Mehranbod, N., and M. Soroush, “Sensor Fault Detection and Identification via Bayesian Belief Networks,” *Proc. of American Contr. Conf.*, 4863–4868 (2003)
28. Quan, C., M. Soroush, and M. C. Grady, “Product Quality Improvement in a High-Temperature, Free-Radical Polymerization Reactor,” *Proc. of American Contr. Conf.*, 3980–3985 (2003)

27. Zambare, N., M. Soroush, and M. C. Grady, “Multi-rate Nonlinear State Estimation in a Polymerization Reactor: a Real-Time Study,” *Proc. of American Contr. Conf.*, 2701–2706 (2002)
26. Kanter, J. M., M. Soroush, and W. D. Seider, “Nonlinear Control of Stable Non-Minimum-Phase Processes,” *Proc. of American Contr. Conf.*, 3624–3629 (2001)
25. Zambare, N., M. Soroush, and B. A. Ogunnaike, “Robustness Improvement in Multi-rate State Estimation,” *Proc. of American Contr. Conf.*, 993–998 (2001)
24. Kanter, J. M., M. Soroush, and W. D. Seider, “Continuous-Time Nonlinear Control of Stable Non-Minimum-Phase Processes,” *Proc. of the IFAC Symposium on Advanced Control of Chemical Processes*, Pisa, Italy, 407–412 (2000)
23. Tyner, D., M. Soroush, M. C. Grady, J. Richards, and J. Congalidis, “Mathematical Modeling and Optimization of a Semi-Batch Polymerization Reactor,” *Proc. of the IFAC Symposium on Advanced Control of Chemical Processes*, Pisa, Italy, 1019–1024 (2000)
22. Soroush, M., N. Mehranbod, and S. M. Alaie, “Process Directionality in Input-Constrained Systems: it Definition and Optimal Compensation,” *Proc. of American Contr. Conf.*, 2002–2006 (1999)
21. Zambare, N., M. Soroush, and B. A. Ogunnaike, “Multirate Control of a Polymerization Reactor: a Comparative Study,” *Proc. of American Contr. Conf.*, 2553–2557 (1999)
20. Tatiraju, S., M. Soroush, and B. A. Ogunnaike, “Multi-Rate Nonlinear State Estimation in a Polymerization Reactor,” *Proc. of American Contr. Conf.*, 3165–3169 (1998)
19. Tatiraju, S., M. Soroush, and R. Mutharasan, “Nonlinear State and Parameter Estimation in a Bioreactor,” *Proc. of American Contr. Conf.*, 2324–2328 (1998)
18. Valluri, S., and M. Soroush, “Input Constraint Handling and Windup Compensation in Nonlinear Control,” *Proc. of American Contr. Conf.*, 1734–1738 (1997)
17. Soroush, M., and S. Valluri, “Calculation of Optimal Feasible Controller Output in Multivariable Processes with Input Constraints,” *Proc. of American Contr. Conf.*, 3475–3479 (1997)
16. Tatiraju, S., and M. Soroush, “Parameter Estimation via Inversion with Application to a Chemical Reactor,” *Proc. of American Contr. Conf.*, 2429–2433 (1997)
15. Nikravesh, M., M. Soroush, and R. M. Johnston, “Nonlinear Control of an Oil Well,” *Proc. of American Contr. Conf.*, 739–743 (1997)
14. Soroush, M., and M. Nikravesh, “Shortest-Prediction-Horizon Nonlinear Model Predictive Control,” *Proc. of IFAC World Congress*, San Francisco, M, 19–23 (1996)
13. Soroush, M., and C. Kravaris, “Short-Horizon Nonlinear Model Predictive Control,” *Proc. of IEEE Conference on Control Applications*, 943–948 (1995)
12. Soroush, M., “Nonlinear State-Observer Design with Application to Chemical Reactors,” *Proc. of DYCOPS*, Helsingor, Denmark, 447–452 (1995)



11. Soroush, M., “Nonlinear Output-Feedback Control of a Polymerization Reactor,” *Proc. of American Contr. Conf.*, Seattle, Washington, 2672–2676 (1995)
10. Soroush, M., “Evaluation of Achievable Control Quality in Nonlinear Processes,” *Proc. of the IFAC Workshop on the Integration of Process Design and Control*, College Park, Maryland, 41–46 (1994)
9. Soroush, M., and S. Valluri, “Optimization and Control of Batch Processes,” *Proc. of American Contr. Conf.*, College Park, Maryland, 490–494 (1994)
8. Soroush, M., “Discrete-Time Feedforward/Feedback Control of Multivariable Nonlinear Processes,” *Proc. of American Contr. Conf.*, College Park, Maryland, 1349–1353 (1994)
7. Soroush, M., and C. Kravaris, “Multivariable Nonlinear Control of a Continuous Polymerization Reactor with Singular Characteristic Matrix: An Experimental Study,” *Proc. of American Contr. Conf.*, San Francisco, 2946–2950 (1993)
6. Soroush, M., and C. Kravaris, “Model Predictive Control of Multivariable Nonlinear Processes in Continuous-Time,” *Proc. of American Contr. Conf.*, San Francisco, 393–399 (1993)
5. Soroush, M., and C. Kravaris, “Nonlinear Control of a Batch Polymerization Reactor: An Experimental Study,” *Proc. of IEEE Conference on Control Applications*, Dayton, Ohio, 51–56 (1992)
4. Soroush, M., and C. Kravaris, “Multivariable Nonlinear Control of a Continuous Polymerization Reactor,” *Proc. of American Contr. Conf.*, Chicago, 607–614 (1992)
3. Soroush, M., and C. Kravaris, “A Continuous-Time Formulation of Nonlinear Model Predictive Control,” *Proc. of American Contr. Conf.*, Chicago, 1561–1567 (1992)
2. Wright, R. A., M. Soroush, and C. Kravaris, “Strong Acid Equivalent Control of pH Processes: An Experimental Study,” *Proc. of American Contr. Conf.*, Boston, 1812–1817 (1991)
1. Soroush, M., and C. Kravaris, “Nonlinear Control of a Batch Polymerization Reactor,” *Proc. of American Contr. Conf.*, Boston, 2879–2885 (1991)

## 6.5 Other Conference Proceedings Papers

3. Nikravesh, M., M. Soroush, M. Johnston, and T. W. Patzek, “Design of Smart Well-head Controllers for Optimal Fluid Injection Policy and Producibility in Petroleum Reservoirs: a Neuro-Geometric Approach,” *1997 International Thermal Operations and Heavy Oil Symposium, Bakersfield, California*, **Paper SPE 37557** (1997)
2. Nikravesh M., M. Soroush, M. Johnston, and T. W. Patzek, “Design of Smart Well-head Controllers for Optimal Fluid Injection Policy and Producibility in Petroleum Reservoirs: a Neuro-Network Model Predictive Approach,” *1997 SPE Production Operations Symposium, Oklahoma City, Oklahoma*, **Paper SPE 37445** (1997)
1. Nikravesh, M., and M. Soroush, “A Theoretical Methodology for Prediction of Gas-Condensate Flow Behavior,” *SPE Annual Technical Conference and Exhibition, 6-9 October, Denver, Colorado*, **Paper SPE 36704** (1996)

## 6.6 Other Journal Publications

2. Soroush, M., “Editorial – Special Issue “Polymer Modeling, Control and Monitoring” of Processes,” *Processes*, **4(3)**, 24; doi:10.3390/pr4030024 (2016)
1. Richards, J.R., M. Soroush, and C. Georgakis, “Preface for John P. Congalidis Memorial Special Issue,” *Ind. & Eng. Chem. Research*, **53 (18)**, 7273–7274 (2014)

## 7 Invited Lectures

### 7.1 Panel/Keynote Presentations

11. Speaker, “Model-Predictive Safety System for Predictive Detection of Operation Hazards: Off-Line Calculation of Most Aggressive Control Actions and Worst-Case Uncertainties,” in *CAST Division 10 Plenary Session at the 2017 AIChE Annual Meeting, Minneapolis, MN*, November (2017)
10. Speaker, “Power Generation and Storage Systems: Model-Guided Optimal Design, Operation and Integration,” in *USA-China Symposium on Energy session, Division of Energy and Fuels, 252nd ACS National Meeting*, Philadelphia, PA, Tuesday, August 23 (2016)
9. Panelist, Panel on “Energy and the Environment,” *Indo-US Joint Symposium on Sustainable Technologies for Energy and Environment in the Indian Chemical Engineering Congress (CHEMCON-2012)*, Jalandhar, India, December 29 (2012)
8. Speaker, “Process Systems Opportunities in Power Generation, Storage and Distribution,” with D. Chmielewski, *Chemical Process Control–VIII*, Savannah, GA (2012)
7. Speaker, “Lasting Academia-Industry Collaboration: Challenges and Rewards,” *Polymer Reaction Engineering 8 Conference*, Cancun, Mexico (2012)
6. Speaker, “Control of Product Quality in Polymerization Processes,” with F. Doyle III, *Chemical Process Control VI*, Tuscan, AZ, January (2000)
5. Speaker, “Analytical Model Predictive Control,” *Workshop on Nonlinear Model Predictive Control*, Ascona, Switzerland, June (1998)
4. Speaker, “Estimation and Inferential Control,” *NSF/NIST/ATP Vision 2020 Workshop on Process Measurement and Control*, New Orleans, LA, March (1998)
3. Speaker, “Optimal Directionality and Windup Compensations,” *AFOSR PRET/ Tailless Workshop on Nonlinear Control with Actuator Limits*, organized by the Department of Mechanical Engineering at California Institute of Technology and the Department of Electrical Engineering at University of California at Santa Barbara, University of California, Santa Barbara, February (1998)
2. Panelist, Panel on “Critique on Research Directions in Nonlinear Control,” *NATO Advanced Study Institute Conference on Nonlinear Model-Based Process Control*, Antalya, Turkey, August (1997)

1. Speaker, “Directionality and Windup Compensation in Nonlinear Model-Based Control,” *NATO Advanced Study Institute Conference on Nonlinear Model-Based Process Control*, Antalya, Turkey, August (1997)

## 7.2 Other Invited Presentations

41. “Factors that Strongly Affect Alkyl Acrylate Polymerization,” Axalta, Experimental Station, DE, February (2017)
40. “Experimental and Theoretical Insights into High-Temperature Polymerization Reactions,” Marun Petrochemical Company, Mahshahr, Iran, June (2015)
39. “Dye Sensitized Solar Cells: Mathematical Modeling, Analysis, and Experimental Studies,” Power Energy Dedicated Advance Centre, University of Malaya, Kuala Lumpur, Malaysia, June (2015)
38. “Experimental and Theoretical Studies of High-Temperature Polymerization Reactions,” Department of Chemical Engineering, University of Malaya, Kuala Lumpur, Malaysia, June (2015)
37. “Long-Term Academia-Industry Collaboration: The Drexel-DuPont Experience,” Department of Chemical Engineering, University of California-Los Angeles, February (2015)
36. “Long-Term Academia-Industry Collaboration: The Drexel-DuPont Experience,” Department of Chemical Engineering, University of Southern California, February (2015)
35. “Collaborative Projects,” Axalta, Wilmington, DE, November (2013)
34. “Probabilistic Process Fault Detection and Risk Assessment,” Air Liquide, Seminar given via WebEx, August (2012)
33. “Collaborative Projects in Process Systems Engineering and Polymer Engineering,” Research Institute of Petroleum Industry (RIPI), Tehran, Iran, July (2012)
32. “Challenges and Rewards in Academia-Industry Research Collaboration,” School of Basic Sciences, Arak University, Arak, Iran, July (2012)
31. “Academia-Industry Collaborative Research Projects,” University of Petroleum Technology, Ahwaz, Iran, July (2012)
30. “Initiating Species in Spontaneous Thermal Free-Radical Polymerization of Alkyl Acrylates,” DuPont Experimental Station, Wilmington, DE, May (2012)
29. “Higher Education and Essentials Needed to Succeed,” Society of Mahallat Graduates, Mahallat, Iran, July (2009)
28. “A Bayesian Approach to Fault Detection and Identification,” Emerson Process Management, MN, January (2007)
27. “Issues in the Optimization of Polymerization Reactors,” DuPont, Wilmington, DE, January (2005)

26. “Process Systems Engineering at Marshall Lab: Observations and Recommendations,” DuPont Marshall Laboratory, Philadelphia, PA, April (2003)
25. “Modeling, Optimization and Monitoring Polymerization Reactors,” DuPont Marshall Laboratory, Philadelphia, PA, April (2003)
24. “Modeling and Optimization of High-Temperature Polymerization of n-Butyl Acrylate and Butyl Methacrylate,” DuPont Marshall Laboratory, Philadelphia, PA, March (2003).
23. “Robust State Estimation,” Department of Chemical Engineering, Worcester Polytechnic Institute, MA, March (2003)
22. “Modeling and Optimization of High-Temperature Polymerization of n-Butyl Methacrylate,” Marshall Laboratory, Philadelphia, PA, February (2003)
21. “Directionality in Input-Constrained Processes,” DuPont Engineering Technology, Process Dynamics & Control, Wilmington, DE, September (2002)
20. “Model-Based Control,” Industrial-Process-Automation Consortium Meeting, Polytechnic University, Brooklyn, NY, April (2002)
19. “Directionality in Input-Constrained Processes,” University of Minnesota, Minneapolis, MN, September (2001)
18. “Applications of Multi-rate Control in Polymer Processes,” Department of Chemical Engineering, Sharif University of Technology, Tehran, Iran, July (2000)
17. “Multi-rate Control in Polymerization Processes,” Polymer Reaction Engineering IV, Palm Coast, Florida, March 19-24 (2000)
16. “Application of Mathematical Models in Process Monitoring and Control,” DuPont Marshall Laboratory, Philadelphia, PA, April (1999)
15. “Process Directionality in Input Constrained Processes: its Definition and Optimal Compensation,” Department of Electrical Engineering, Sharif University of Technology, Tehran, Iran, December (1998)
14. “Multi-Rate State Estimator Design,” Department of Chemical Engineering, Sharif University of Technology, Tehran, Iran, December (1998)
13. “Multi-Rate State Estimation,” Department of Chemical Engineering, Amir-Kabir University of Technology, Tehran, Iran, December (1998)
12. “Multi-Rate Nonlinear State Estimator Design,” Department of Chemical Engineering, Texas A&M University, College Station, TX, April (1998)
11. “Process Directionality: its Definition and Optimal Compensation,” Dynamics and Control Seminar series, Department of Chemical Engineering, University of Delaware, Newark, DE, April (1998)
10. “Multi-Rate Nonlinear State Estimator Design,” Department of Chemical Engineering, Auburn University, Auburn, AL, April (1998)

9. “Nonlinear State Estimator Design,” Department of Chemical Engineering, University of Pennsylvania, Philadelphia, PA, March (1998)
8. “Nonlinear State Estimation with Application to Chemical Processes,” Department of Chemical Engineering, University of California, Santa Barbara, February (1998)
7. “Directionality and Windup Compensation in Nonlinear Model-Based Control,” Department of Chemical Engineering, Amir-Kabir University, Tehran, Iran, September (1997)
6. “Nonlinear State Observer Design,” Department of Chemical Engineering, Amir-Kabir University, Tehran, Iran, August (1997)
5. “Nonlinear Model-Based Control of a Batch Polymerization Reactor,” Department of Chemical Engineering, Amir-Kabir University, Tehran, Iran, August (1997)
4. “Nonlinear State Estimation,” Chemical Process Modeling & Control Research Center, Lehigh University, Bethlehem, PA, November (1996)
3. “Nonlinear Model-Based Control of a Polymerization Reactor,” Bristol Research, Rohm & Haas Company, Bristol, PA, January (1996)
2. “Nonlinear Model-Based Control of a Batch Polymerization Reactor,” DuPont Central Science and Engineering, Wilmington, DE, February (1996)
1. “Synthesis of Feedback Control Systems for Nonlinear Processes: application to a Polymerization Reactor,” Dow Chemical Co., Midland, MI, February (1992)

## 8 Other Presentations at Professional Meetings

116. Soroush, M. (speaker), J.E. Arbogast, and W.D. Seider, “Model-Predictive Safety System for Predictive Detection of Operation Hazards: Off-Line Calculation of Most Aggressive Control Actions and Worst-Case Uncertainties,” *AIChE Annual Meeting, Minneapolis, MN*, November (2017)
115. Soroush, M. (speaker), J.E. Arbogast, and W.D. Seider, “Model-Predictive Safety System for Predictive Detection of Operation Hazards,” *AIChE Annual Meeting, Minneapolis, MN*, November (2017)
114. Mohseni Ahooyi, T., J.E. Arbogast, and M. Soroush (speaker), “A Scalable Statistical Machine Learning Method: Application for Fault Detection and Fault Propagation Pattern Inference in the Tennessee Eastman Process,” *AIChE Annual Meeting, Minneapolis, MN*, November (2017)
113. Riazi, H., A.A. Shamsabadi, M.C. Grady, A.M. Rappe, and M. Soroush (speaker), “Experimental and Macroscopic Mechanistic Modeling Studies of the Methyl Acrylate Self-Initiation Reaction,” *AIChE Annual Meeting, Minneapolis, MN*, November (2017)
112. Zirehpour, A., A. Rahimpour, A.A. Shamsabadi (speaker), and M. Soroush, “Mitigation of Thin Film Composite Membrane Biofouling via Immobilizing Nano-Sized Biocidal Reservoirs in the Membrane Active Layer,” *AIChE Annual Meeting, Minneapolis, MN*, November (2017)

111. Shamsabadi, A.A. (speaker), F, Seidi, E. Salehi, M. Nozari, A. Rahimpour, and M. Soroush, “Comparative Study of Two Nano-Composite Membranes for Efficient CO<sub>2</sub> Removal,” *AIChE Annual Meeting, Minneapolis, MN*, November (2017)
110. Shamsabadi, A.A. (speaker), F, Seidi, M. Nozari, and M. Soroush, “A High Free-Volume Pentiptycene-Based Polyimide for CO<sub>2</sub> Removal,” *AIChE Annual Meeting, Minneapolis, MN*, November (2017)
109. Shamsabadi, A.A. (speaker), M. Sadeghi, M. Dinari, M. Ronasi, and M. Soroush, “Effects of Cyanuric Chloride and Its Derivatives on Gas Separation Properties of Polyurethane Membranes,” *AIChE Annual Meeting, Minneapolis, MN*, November (2017)
108. Shamsabadi, A.A. (speaker), M. Sadeghi, M. Dinari, M. Ronasi, and M. Soroush,, “Improving Gas Transport Properties of Mixed Matrix Membranes via Interfacial Improvement *AIChE Annual Meeting, Minneapolis, MN*, November (2017)
107. Smolin, Y.Y. (speaker), A.G. Kuba, M. Soroush, and K.K.S. Lau, “Enhancing Dye Sensitized Solar Cell J-V Behavior By Integrating Nanoscale Polymer Films,” *AIChE Annual Meeting, San Francisco, CA*, November (2016)
106. Smolin, Y.Y. (speaker), K.K.S. Lau, and M. Soroush, “Model-Guided Optimization of Polymer-Electrolyte Dye Sensitized Solar Cells,” *AIChE Annual Meeting, San Francisco, CA*, November (2016)
105. Smolin, Y.Y. (speaker), A.G. Kuba, M. Soroush, and K.K.S. Lau, “Integration of Ultrathin Polyaniline Films into Carbide Derived Carbon Supercapacitors Via Oxidative Chemical Vapor Deposition,” *AIChE Annual Meeting, San Francisco, CA*, November (2016)
104. Smolin, Y.Y. (speaker), K.L. Van Aken, M. Boota, M. Soroush, Y. Gogotsi, and K.K.S. Lau, “Model-Guided Design and Optimization of Polymer-Electrolyte Dye Sensitized Solar Cells,” Symposium: D01: Photovoltaics for the 21st Century, PRiME 2016, Honolulu, Hawaii, Abstract Number/Title/Authors: # D01-1388, October 2-6 (2016)
103. Smolin, Y.Y. (speaker), K.L. Van Aken, M. Boota, M. Soroush, Y. Gogotsi, and K.K.S. Lau, “Synthesis and Integration of Ultrathin Polyaniline Films into Carbide Derived Carbon Supercapacitors,” The Electrochemical Society (ECS) Meeting Abstracts, **7**, 1004–1004 (2016)
102. Smolin, Y.Y. (speaker), A. G. Kuba, K.K.S. Lau, and M. Soroush, “Model-Guided Design and Optimization of Polymer-Electrolyte Dye Sensitized Solar Cells,” he Electrochemical Society (ECS) Meeting Abstracts, **15**, 1388–1388 (2016)
101. Arbogast, J.E. (speaker), T. Mohseni Ahooyi, and M. Soroush, “Application of the Rolling Pin Method to Detect Anomalies and Fault Conditions,” *Machinery Failure Prevention Technology (MFPT) 2016 Conference, Dayton, OH, USA, Session C4: Diagnostics and Prognostics Wednesday, May 25, 2016 2:30 PM*.
100. Seider, W.D. (speaker), J.E. Arbogast, U.G. Oktem, and M. Soroush, “Process Safety – a Systems Perspective,” *AIChE Annual Meeting, Salt Lake City, UT*, November (2015)

99. Mohseni Ahooyi, T. (speaker), J.E. Arbogast, W.D. Seider, U.G. Oktem, and M. Soroush, “A Method of Proactive Model-Based Alarm System Design,” *AIChE Annual Meeting, Salt Lake City, UT*, November (2015)
98. Moskowitz, I. (speaker), W.D. Seider, U.G. Oktem, J.E. Arbogast, and M. Soroush, “A Method of Evaluating Plant Models to Predict Safety-System Failure Probabilities,” *AIChE Annual Meeting, Salt Lake City, UT*, November (2015)
97. Mohseni Ahooyi, T. (speaker), J.E. Arbogast, and M. Soroush, “A Semi-Parametric Independent Component Analysis Method for Multivariate Process Monitoring,” *AIChE Annual Meeting, Salt Lake City, UT*, November (2015)
96. Smolin, Y.Y. (speaker), K.K.S. Lau, and M. Soroush, “Electrochemical Impedance Spectroscopy Analysis of Polymer-Electrolyte Dye Sensitized Solar Cells Using First-Principles Macroscopic Modeling,” *AIChE Annual Meeting, Salt Lake City, UT*, November (2015)
95. Smolin, Y.Y. (speaker), K.K.S. Lau, and M. Soroush, “Electrochemical Impedance Spectroscopy Analysis of Polymer-Electrolyte Dye Sensitized Solar Cells Using First-Principles Macroscopic Modeling,” *AIChE Annual Meeting, Salt Lake City, UT*, November (2015)
94. Smolin, Y.Y. (speaker), K.K.S. Lau, and M. Soroush, “Theoretical and Experimental Investigations to Optimize Polymer-Electrolyte Dye Sensitized Solar Cells,” *DuPont Engineering Lecture Series*, DuPont Experimental Station (2015)
93. Smolin, Y.Y. (speaker), K.K.S. Lau, and M. Soroush, “Integration and Modeling of Polymer Electrolytes for Dye Sensitized Solar Cells,” *Nano, Polar, and Inorganic/Organic Materials: New Vistas in Photovoltaics symposium*, U. of Pennsylvania (2015)
92. Smolin, Y.Y. (speaker), K.K.S. Lau, and M. Soroush, “Model-Guided Design of Polymer-Electrolyte Dye Sensitized Solar Cells,” *Research Day*, Drexel University (2014)
91. Smolin, Y.Y. (speaker), M. Soroush, and K.K.S. Lau, “Chemical Vapor Deposition (CVD) Techniques for Integration of Conformal Polymer Electronic Materials into Nanostructured Energy Devices,” *Nano For Business*, Lehigh University (2014)
90. Smolin, Y.Y. (speaker), S. Nejati, M. Bavarian, K.K.S. Lau, and M. Soroush, “Theoretical & Experimental Investigation of the Effects of Polymer Chemistry on Polymer-Electrolyte Dye Sensitized Solar Cell Performance,” *AIChE Annual Meeting, Atlanta, GA*, November (2014)
89. Smolin, Y.Y. (speaker), S. Farrell, S. Janakiraman, M. Soroush, and K.K.S. Lau, “Polymer Electrolyte Integration Via iCVD for Applications in Dye Sensitized Solar Cells,” *AIChE Annual Meeting, Atlanta, GA*, November (2014)
88. Moskowitz, I. (speaker), W.D. Seider, M. Soroush, U. Oktem, and J.E. Arbogast, “Modeling Steam-Methane Reforming for Dynamic Risk Analysis,” *AIChE Annual Meeting, Atlanta, GA*, November (2014)
87. Mohseni Ahooyi, T. (speaker), J.E. Arbogast, W.D. Seider, U. Oktem, and M. Soroush, “Probabilistic Model-Based Method of Improving Alarm-System Performance,” *AIChE Annual Meeting, Atlanta, GA*, November (2014)

86. Mohseni Ahooyi, T. (speaker), J.E. Arbogast, W.D. Seider, U. Oktem, and M. Soroush, “Determination of Direct Causal Relationships among Variables in Process Systems,” *AIChE Annual Meeting, Atlanta, GA*, November (2014)
85. Smolin, Y.Y., C., Y. Hsieh, S. Nejati, M. Soroush, and K.K.S. Lau, “iCVD Synthesis of Polymer Electrolytes for Application in Dye Sensitized Solar Cells (DSSCs),” *ECS: Thermal and Plasma CVD of Nanostructures*, (2014)
84. Mohseni Ahooyi, T. (speaker), A. Prabhu, U. Oktem, W.D. Seider, and M. Soroush, “Constrained Parametric Estimation of Multivariate Probability Density Functions From Normal Operation Data and Its Application to Fault Detection,” *AIChE Annual Meeting, San Francisco, CA*, November (2013)
83. Moghadam, N. (speaker), P. Corcoran, S. Srinivasan, M.C. Grady, A.M. Rappe, and M. Soroush, “Macroscopic Modeling of Spontaneous-Thermal Polymerization of n-Butyl Acrylate,” *AIChE Annual Meeting, San Francisco, CA*, November (2013)
82. Moghadam, N. (speaker), S. Liu, S. Srinivasan, M.C. Grady, A.M. Rappe, and M. Soroush, “A Theoretical Study of Mechanisms of Alkyl Acrylate Polymer Chain Transfer to Several Solvents,” *AIChE Annual Meeting, San Francisco, CA*, November (2013)
81. Liu, S. (speaker), S. Srinivasan, M.C. Grady, M. Soroush, and A.M. Rappe, “Hydrogen-Bonding-Suppressed Backbiting Reactions in Radical Polymerization of Acrylates: A Computational Study of Solvent Effects,” *AIChE Annual Meeting, San Francisco, CA*, November (2013)
80. Liu, S. (speaker), S. Srinivasan, M.C. Grady, M. Soroush, and A.M. Rappe, “New Insights On Mechanisms of Backbiting and  $\beta$ -Scission Reactions in Self-Initiated Polymerization of Methyl Acrylate,” *AIChE Annual Meeting, San Francisco, CA*, November (2013)
79. Bavarian, M., S. Nejati, K.K.S. Lau, and M. Soroush (speaker), “Mathematical Modeling and Design Optimization of Dye Sensitized Solar Cells,” *Indo-US Joint Symposium on Sustainable Technologies for Energy and Environment in the Indian Chemical Engineering Congress (CHEMCON-2012), Jalandar, India*, December 27-29 (2012)
78. Moghadam, N. (speaker), M. Soroush, A.M. Rappe, S. Liu, S. Srinivasan, and M.C. Grady, “A Theoretical Study of Mechanisms for Chain Transfer to Monomer Reactions in Alkyl Acrylates,” *AIChE Annual Meeting, Pittsburgh, PA*, November (2012)
77. Mohseni Ahooyi, T. (speaker), M. Soroush, W.D. Seider, U. Oktem, D. Feather, J.E. Arbogast, and A. Prabhu, “A Method of Estimating the Probability of Rare Events in Bayesian Networks with Application to Risk Assessment in Processes,” *AIChE Annual Meeting, Pittsburgh, PA*, November (2012)
76. Moghadam, N. (speaker), M. Soroush, A.M. Rappe, S. Liu, S. Srinivasan, and M.C. Grady, “Kinetics of Mechanisms of Chain Transfer to Polymer Reactions in Alkyl Acrylates: A Theoretical Study,” *AIChE Annual Meeting, Pittsburgh, PA*, November (2012)
75. Liu, S. (speaker), S. Srinivasan, M.C. Grady, M. Soroush, and A.M. Rappe, “Understanding Backbiting and  $\beta$ -Scission Reactions in Self-Initiated Polymerization of Methyl Acrylate: A Theoretical Study,” *AIChE Annual Meeting, Pittsburgh, PA*, November (2012)



74. Corcoran, P., M.C. Grady, M. Soroush (speaker), and A.R. Andrew, “Initiating Species in Spontaneous Thermal Free-Radical Polymerization of Alkyl Acrylates,” *Polymerization Reaction Engineering VIII*, Cancun, Mexico, May 6-11 (2012)
73. Bavarian, M. (speaker), S. Nejati, K. K.S. Lau, and M. Soroush, “Mathematical Modeling and Analysis of a Quasi-Solid-State-Electrolyte DSSC,” *Chemical Engineering Symposium at The New York Academy of Sciences*, New York, NY, 3/30/2012
72. Pariyani, A. (speaker), W.D. Seider, U. Oktem, and M. Soroush, “Risk Analysis In the Process Industries: A Perspective,” *AIChE Annual Meeting, Minneapolis, MN*, November (2011)
71. Bavarian, M. (speaker), and M. Soroush, “Mathematical Modeling and Steady-State Analysis of a Hybrid Solid Oxide Fuel Cell,” *AIChE Annual Meeting, Minneapolis, MN*, November (2011)
70. Bavarian, M. (speaker), and M. Soroush, “Mathematical Modeling and Steady-State Analysis of a Proton-Conducting Solid Oxide Fuel Cell,” *AIChE Annual Meeting, Minneapolis, MN*, November (2011)
69. Bavarian, M. (speaker), S. Nejati, K. Lau, and M. Soroush, “Mathematical Modeling of a Dye-Sensitized Solar Cell,” *AIChE Annual Meeting, Minneapolis, MN*, November (2011)
68. Moghadam, N. (speaker), S. Srinivasan, M.C. Grady, M. Soroush, and A.M. Rappe, “Computational Study of Chain Transfer to Monomer Reactions in Thermal Polymerization of Methyl Acrylate,” *AIChE Annual Meeting, Minneapolis, MN*, November (2011)
67. Moghadam, N. (speaker), S. Srinivasan, M.C. Grady, M. Soroush, and A.M. Rappe, “Chain Transfer to Polymer Reactions in Thermal Polymerization of Methyl Acrylate: Computational Study,” *AIChE Annual Meeting, Minneapolis, MN*, November (2011)
66. Liu, S. (speaker), S. Srinivasan, M.C. Grady, M. Soroush, and A.M. Rappe, “Computational Study of the Mechanism of Initiation by Cyclohexanone in Thermal Polymerization of Methyl Acrylate and Methyl Methacrylate,” *AIChE Annual Meeting, Minneapolis, MN*, November (2011)
65. Pariyani, A. (speaker), J.E. Arbogast, W.D. Seider, U. Oktem, M. Soroush, O. Cadet, “Alarm Management for Improved Process Safety, Reliability, and Product Quality,” *AIChE Spring Meeting, Chicago, IL*, March (2011)
64. Pariyani, A. (speaker), W.D. Seider, U.G. Oktem, M. Soroush, Olivier Cadet, and J.E. Arbogast, “Leading Indicators to Predict Incidents and Alarm Management in Chemical Plants Using Near Miss Analysis,” *Mary Kay O’Connor Process Safety Center 2010 International Symposium*, Texas A&M University, College Station, TX (2010)
63. Pariyani, A. (speaker), W.D. Seider, U. Oktem, and M. Soroush, “A Novel Approach to Develop Real-Time Leading Indicators to Predict Incidents in Chemical Plants by Utilizing near-Misses,” *AIChE Annual Meeting, Salt Lake City, UT*, November (2010)
62. Bavarian, M. (speaker), and M. Soroush, “Impacts of Practical Considerations on the Steady-State Behavior of a Solid Oxide Fuel Cell,” *AIChE Annual Meeting, Salt Lake City, UT*, November (2010)

61. Srinivasan, S. (speaker), M.W. Lee, M.C. Grady, M. Soroush, and A.M. Rappe, “Theoretical Evidence to Diradical Self-Initiation in Spontaneous Thermal Polymerization of Methyl Methacrylate,” *AIChE Annual Meeting, Salt Lake City, UT*, November (2010)
60. Srinivasan, S. (speaker), N. Moghadam, M.C. Grady, M. Soroush, and A.M. Rappe, “Effect of Solvent on Polymer Chain Length and Chain-Transfer Reactions in Self-Initiated High-Temperature Polymerization of Methyl Acrylate,” *AIChE Annual Meeting, Salt Lake City, UT*, November (2010)
59. Srinivasan, S. (speaker), T. Rier, G.A. Kalfas, C. Bruni, M.C. Grady, and M. Soroush, “Macroscopic Mechanistic Modeling Studies of Self-Initiated High-Temperature Polymerization of Alkyl Acrylates,” *AIChE Annual Meeting, Salt Lake City, UT*, November (2010)
58. Pariyani, A. (speaker), W.D. Seider, U. Oktem, and M. Soroush, “Dynamic Risk Analysis: A Case Study on a Fluidized Catalytic Cracking Unit at the Bahrain Petroleum Company,” *AIChE Annual Meeting, Nashville, TN*, November (2009)
57. Bavarian, M., J.L. Garriga (speaker), and M. Soroush, “Dynamic Modeling and Analysis of a Tubular Solid Oxide Fuel Cell,” *AIChE Annual Meeting, Nashville, TN*, November (2009)
56. Garriga, J.L. (speaker), and M. Soroush, “Modeling Interictal and Preictal Seizure States Using Stochastic Differential Equations,” *AIChE Annual Meeting, Nashville, TN*, November (2009)
55. Srinivasan, S. (speaker), M.W. Lee, M.C. Grady, M. Soroush, and A.M. Rappe, “High Temperature Self-Initiation In Ethyl Acrylate Polymerization. A Computational Study,” *AIChE Annual Meeting, Philadelphia, PA*, November (2008)
54. Pariyani, A. (speaker), W.D. Seider, U. Oktem, and M. Soroush, “Synergistic Improvement of Process Safety and Product Quality,” *AIChE Annual Meeting, Philadelphia, PA*, November (2008)
53. Sahraneshin, A., N. Mehranbod, R. Eslamlouian, M. Soroush (speaker), “Data-Driven State and Parameter Estimation Using Bayesian Belief Networks,” *AIChE Annual Meeting, Philadelphia, PA*, November (2008)
52. Srinivasan, S. (speaker), M.W. Lee, M.C. Grady, M. Soroush, and A.M. Rappe, “Mechanism of Spontaneous Initiation In High-Temperature Polymerization of n-Butyl Acrylate: A Theoretical Study,” *AIChE Annual Meeting, Philadelphia, PA*, November (2008)
51. Srinivasan, S. (speaker), C. Bruni, G.A. Kalfas, M.C. Grady, and M. Soroush, “Understanding Kinetics of Spontaneous Thermal Polymerization of Alkyl Acrylates: An Experimental Study,” *AIChE Annual Meeting, Philadelphia, PA*, November (2008)
50. Srinivasan, S. (speaker), M.W. Lee, M.C. Grady, M. Soroush, and A.M. Rappe, “Self-Initiation in High-Temperature Polymerization of Alkyl Acrylates - a Theoretical Study of the Mechanism,” *AIChE Annual Meeting, Salt Lake City, UT*, November (2007)

49. Srinivasan, S. (speaker), M.C. Grady, G.A. Kalfas, and M. Soroush, “A Comparative Study of Two Commercial Calorimeters Using Free-Radical Polymerization Experiments and Model Predictions,” *AIChE Annual Meeting, Salt Lake City, UT*, November (2007)
48. Garriga, J.L., and M. Soroush (speaker), “Eigenvalue (Pole) Placement Using Model Predictive Control,” *AIChE Annual Meeting, Salt Lake City, UT*, November (2007)
47. Soroush, M. (speaker), F. S. Rantow, and Y. Dimitratos, “On the Role of Directionality in Analytical Model Predictive Control,” *AIChE Annual Meeting, San Francisco, CA*, November (2006)
46. Rantow, F., M. Soroush (speaker), and M. Grady, “Model Robust Estimation of Measurable Spectroscopic Indices in a High-Temperature Polymerization Reactor: a Real-Time Study,” *AIChE Annual Meeting, San Francisco, CA*, November (2006)
45. Rantow, F. (speaker), M. Grady, and M. Soroush, “Reaction Network Identification in High-Temperature Polymerization of n-Butyl Acrylate: A Simultaneous Parameter Estimation Approach,” *AIChE Annual Meeting, Cincinnati, OH*, November (2005)
44. Rantow, F. (speaker), M. Grady, and M. Soroush, “Model for Polymer Microstructure Monitoring and Control in Solution Polymerization of Alkyl Acrylates,” *AIChE Annual Meeting, Cincinnati, OH*, November (2005)
43. Metta, S., M. Soroush (speaker), and N. Mehranbod, “Probabilistic Sensor Fault Detection and Identification in Distributed Parameter Systems,” *AIChE Annual Meeting, Cincinnati, OH*, November (2005)
42. Soroush, M. (speaker), and J. Elabd, “Control Configuration Selection for Fuel Cell Stack Systems,” *AIChE Annual Meeting, Cincinnati, OH*, November (2005)
41. Kalfas, G. (speaker), M. Grady, and M. Soroush, “Improved Scale-Up of a Resin Manufacturing Process through Process Modeling,” *AspenWorld Conference* (2004)
40. Soroush, M. (speaker), and J. Elabd, “Process Systems Engineering Challenges in Fuel Cell Technology for Automobiles,” *AIChE Annual Meeting, Austin, Texas*, November (2004)
39. Meel, A. (speaker), W.D. Seider, and M. Soroush, “Analysis of a Class of Process Designs that Are Hard to Control,” *AIChE Annual Meeting, Austin, Texas*, November (2004)
38. Panjapornpon, C., M. Soroush (speaker), and W. D. Seider, “Nonlinear Output-Tracking with Guaranteed Asymptotic Stability,” *AIChE Annual Meeting, Austin, Texas*, November (2004)
37. Rantow, F. (speaker), M. Soroush, and M.C. Grady, “High-Temperature Acrylate Polymerization: Decentralized Parameter Estimation and Multi-Rate State Estimation,” *AIChE Annual Meeting, Austin, Texas*, November (2004)
36. Panjapornpon, C., M. Soroush (speaker), and W. D. Seider, “Software for Analytical Model-Based Controller Design,” *AIChE Annual Meeting, San Francisco, CA*, November (2003)

35. Quan, C., M. Soroush (speaker), and M.C. Grady, “Modeling and Optimization of High-Temperature (140-200 C) n-Butyl Acrylate Polymerization ,” *AIChE Annual Meeting, San Francisco, CA*, November (2003)
34. Quan, C. (speaker), M. Grady, and M. Soroush, “Characterization and Kinetics of High-temperature Polymerization of n-Butyl Acrylate,” *AIChE Annual Meeting, Indianapolis, IN*, November (2002)
33. Mehranbod, N. (speaker), M. Soroush, M. J. Piovoso, and B. A. Ogunnaike, “A Bayesian Approach to Sensor Fault Detection and Identification in Batch Processes,” *AIChE Annual Meeting, Indianapolis, IN*, November (2002)
32. Zambare, N., M. Soroush (speaker), and B. A. Ogunnaike, “Real-time, Robust, Multi-rate, Nonlinear State Estimation in a Polymerization Reactor,” *AIChE Annual Meeting, Reno, NV*, November (2001)
31. Quan, C. (speaker), M. Grady, and M. Soroush, “Mathematical Modeling of High-temperature, Free-radical Polymerization of Butyl Acrylate,” *AIChE Annual Meeting, Reno, NV*, November (2001)
30. Mehranbod, N. (speaker), M. Soroush, M. J. Piovoso, and B. A. Ogunnaike, “Sensor Fault Detection and Classification by Bayesian Belief Networks,” *AIChE Annual Meeting, Reno, NV*, November (2001)
29. Kanter, J. M., M. Soroush (speaker), and W. D. Seider, “Real-time, Model-based Control of a Non-minimum-phase Process,” *AIChE Annual Meeting, Reno, NV*, November (2001)
28. Zambare, N. (speaker), M. Soroush, and B. A. Ogunnaike, “Robust State Estimation,” *AIChE Annual Meeting, Los Angeles, CA*, November (2000)
27. Kanter, J. M. (speaker), M. Soroush, and W. D. Seider, “Nonlinear Feedback Control of Multivariable Non-minimum-phase Processes,” *AIChE Annual Meeting, Los Angeles, CA*, November (2000)
26. Kanter, J. M., M. Soroush (speaker), and W. D. Seider, “Model-based Control of Non-minimum-phase Nonlinear Processes,” *AIChE Annual Meeting, Dallas, Texas*, November (1999)
25. Soroush, M. (speaker), and D. Tyner, “Adaptive Cascade Temperature Control of Jacketed Reactors,” *AIChE Annual Meeting, Miami, FL*, November (1998)
24. Zambare, N., M. Soroush (speaker), and B. A. Ogunnaike, “Multi-Rate Control of a Polymerization Reactor,” *Miami, FL*, November (1998)
23. Soroush, M. (speaker), “Process Directionality: it Definition and Optimal Compensation,” *AIChE Annual Meeting, Miami, FL*, November (1998)
22. Tatiraju, S., N. Zambare, M. Soroush (speaker), and B. A. Ogunnaike, “Multi-Rate Control of a Polymerization Reactor,” *AIChE National Meeting, New Orleans, LA March* (1998)

21. Soroush, M. (speaker), and S. Valluri, “Optimal Directionality Compensation in Multivariable Processes with Input Saturation Nonlinearities,” *AIChE Annual Meeting*, Los Angeles, November (1997)
20. Nikraves, M., M. Soroush (speaker), and M. Johnston, “Nonlinear Model-Based Control of Petroleum Reservoirs,” *AIChE Annual Meeting*, Los Angeles, November (1997)
19. Tatiraju, S., M. Soroush (speaker), and B. A. Ogunnaike, “Multi-Rate Nonlinear State Estimation in a Polymerization Reactor,” *AIChE Annual Meeting*, Los Angeles, November (1997)
18. Valluri, S., and M. Soroush (speaker), “Nonlinear Control of Multivariable Processes with Input Saturation Nonlinearities,” *AIChE Annual Meeting*, Los Angeles, November (1997)
17. Narayan, P. (speaker), M. A. Wheatley, and M. Soroush “Acoustic Behavior of Polymeric Microcapsules as Ultrasound Contrast Agents: Model Development and Validation,” *AIChE Annual Meeting*, Los Angeles, November (1997)
16. Tatiraju, S. (speaker), M. Soroush, and B. A. Ogunnaike, “Multi-Rate Nonlinear State Estimation in a Polymerization Reactor,” *Engineering Foundation Conference on Polymer Reaction Engineering*, Palm Coast, FL, March (1997)
15. Tatiraju, S., M. Soroush (speaker), and R. Mutharasan, “Nonlinear State and Parameter Estimation in a Bioreactor,” *AIChE Annual Meeting*, Chicago, IL, November (1996)
14. Tatiraju, S. (speaker), and M. Soroush, “Nonlinear State-Estimation in a Polymerization Reactor,” *AIChE Annual Meeting*, Chicago, IL, November (1996)
13. Tatiraju, S., M. Nikraves, M. Soroush (speaker), and B. A. Ogunnaike, “Nonlinear Neural-Network-Model-Based Control of a Polymerization Reactor,” *AIChE Annual Meeting*, Chicago, IL, November (1996)
12. Soroush, M. (speaker), “An Approach to Nonlinear State Estimation,” *AIChE Annual Meeting*, Miami, Florida, November (1995)
11. Valluri, S. (speaker), and M. Soroush, “Nonlinear State Estimation in an Exothermic Reactor,” *AIChE Annual Meeting*, Miami, Florida, November (1995)
10. Soroush, M. (speaker), “Discrete-Time Feedback Control of Nonlinear Processes with Singular Characteristic Matrix,” *AIChE Annual Meeting*, San Francisco, November (1994)
9. Soroush, M. (speaker), and S. Valluri, “Optimization and Control of Batch Processes,” *AIChE Annual Meeting*, San Francisco, November (1994)
8. Soroush, M. (speaker), and C. Kravaris, “A System-Theoretic Approach for Synthesis of Nonlinear Model Predictive Controllers,” *AIChE Annual Meeting*, St. Louis, November (1993)
7. Soroush, M. (speaker), and C. Kravaris, “Nonlinear Control of a Continuous Polymerization Reactor: An Experimental Study,” *AIChE Annual Meeting*, Miami, Florida, November (1992)

6. Soroush, M. (speaker), and C. Kravaris, “Feedforward/Feedback Control of Discrete-Time Nonlinear Systems,” *AIChE Annual Meeting*, Miami, Florida, November (1992)
5. Soroush, M. (speaker), and C. Kravaris, “Nonlinear Control of a Batch Polymerization Reactor: An Experimental Study,” *AIChE Annual Meeting*, Los Angeles, November (1991)
4. Daoutidis, P. (speaker), M. Soroush, and C. Kravaris, “Dynamic Output Feedback Control of Multivariable Nonlinear Processes,” *AIChE Annual Meeting*, Los Angeles, November (1991)
3. Soroush, M., and C. Kravaris (speaker), “Optimal Design and Operation of Batch Reactors,” *AIChE Annual Meeting*, Chicago, November (1990)
2. Daoutidis, P. (speaker), M. Soroush, and C. Kravaris, “Feedforward/Feedback Control of Multivariable Nonlinear Processes,” *AIChE Annual Meeting*, San Francisco, California, November (1989)
1. Kravaris, C. (speaker), and M. Soroush, “Multivariable Nonlinear Control by Global Input/Output Linearizing,” *AIChE Annual Meeting*, Washington D.C., November (1988)

## 9 Teaching Experience

### 9.1 New Courses Introduced and Developed

◇ **CHE 307: Process Modeling I, and CHE 308: Process Modeling II**

These two core Chemical Engineering undergraduate courses, four quarter-credit hours each, were developed and introduced into the Chemical Engineering Undergraduate Curriculum at Drexel University in 1996. Inductive learning methods such as inquiry learning and problem-based learning have been used in the courses to maximize the students’ attentiveness throughout the entire learning process. The courses include a novel collection of multi-disciplinary complementary process modeling examples. The objectives of the course development and introduction have been threefold: first, to fill the gap that existed between the mathematics courses taken during the freshman year and the Chemical Engineering courses taken in the following years, second, to improve engineering judgment of Chemical Engineering students, and third, to provide the students with a strong lasting background in process modeling that enables them to attack and solve open-ended process modeling problems systematically. The two courses have proven successful in achieving the aforementioned objectives. They have been offered in pre-junior and junior years (Years 3 and 4 of our 5-year undergraduate program), respectively; the students take the first modeling course after they have just taken Material and Energy Balances. Some 95% of Drexel undergraduate Chemical Engineering students select a five-year program including one and one-half years of co-op experience in industry. The open-ended nature of homework problems and the richness of lecture contents, including simple, physically meaningful examples from different disciplines, are among the major features of the two courses. These two courses differ from previous courses taken by the students in several aspects, but perhaps the most important is that the students derive equations from physical problem descriptions, rather than plug numbers into previously derived equations. This equation derivation task represents an active learning process, which requires the students

to make a number of engineering judgments to solve process modeling problems in class. Many students view this as a major challenge initially in Process Modeling I, but they soon meet the challenge. The in-class students' activity and engagement in solving modeling problems included in lectures represents an active learning process.

## 9.2 Courses Revised

- ◇ CHE 502: Mathematical Methods in Chemical Engineering
- ◇ CHE 554: Process Systems Engineering

## 9.3 Courses Taught

### 9.3.1 Drexel

- ◇ See Table 1

### 9.3.2 University of Michigan

- ◇ CHE 360: Undergraduate Unit Operation Laboratory, Winter 1992–93

### 9.3.3 Abadan Institute of Technology

- ◇ CHE 315: Fundamentals of Electrical Engineering Laboratory, Fall Term 1985-86, Winter Term 1985–86
- ◇ CHE 413: Process Control Laboratory Fall Term 1985-86, Winter Term 1985–86
- ◇ CHE 414: Fundamentals of Refining Engineering Laboratory, Fall Term 1985–86, Winter Term 1985–86

## 10 Other Professional Activities

### 10.1 National/International Positions and Committees Served on

64. Member of the Editorial Board of International Journal of Process Systems Engineering
63. Member of International Federation of Automatic Control (IFAC) Technical Committee (TC) 6.3. Power and Energy Systems
62. Member of The American Society of Mechanical Engineers (ASME) Energy Systems Technical Committee (ES-TC)
61. Member of IEEE Technical Committee on Process Control
60. Member of the International Program Committee of the 2019 IFAC Workshop on Control of Smart Grid and Renewable Energy Systems (CSGRES 2019), Jeju Island, Korea, June 10 – 12, 2019

Table 1: Courses Taught at Drexel<sup>1</sup>

Year	Fall Term	Winter Term	Spring Term
93–94	CHE 420	CHE 502	CHE 420, CHE 554
94–95	CHE 420	CHE 502	CHE 420, CHE 554
95–96	CHE502	CHE337, CHE513	CHE 554
96–97	CHE 307, CHE 502	CHE 332, CHE 337	CHE 307, CHE 554
97–98	CHE 307, CHE 502	CHE 308, CHE 332	CHE 307, CHE 554
98–99	CHE 307, CHE 502	CHE 308	CHE 307, CHE 554
99–00	CHE 307	CHE 308	CHE 307, CHE 554
00–01	CHE 307, CHE 420	CHE 308	CHE 307, CHE 554
01–02	CHE 307, CHE 502	CHE 308	CHE 307, CHE 554
02–03	CHE 307	CHE 308	CHE 307, CHE 554
03–04	CHE 307	CHE 308	CHE 554
04–05	CHE 307	CHE 308	CHE 554
05–06	CHE 307	CHE 420	CHE 554
06–07	CHE 307, CHE 420	CHE 308	CHE 554
07–08	CHE 307, CHE 420		
08–09	CHE 420	CHE 308	CHE 307, CHE 554
09–10	CHE 307	CHE 308	CHE 307, CHE 554
10–11	CHE 307, CHE 420		CHE 307, CHE 554
11–12	CHE 420, ENGR 101L	CHE 308, ENGR 102L	CHE 554, ENGR 103L
12–13	CHE 420, ENGR 101L	CHE 308, ENGR 102L	CHE 554, ENGR 103L
13–14	CHE 420, ENGR 101L	CHE 308, ENGR 102L	CHE 554
14–15	CHE 420, ENGR 101L	CHE 308, ENGR 102L	CHE 554
15–16	CHE 420, ENGR 101L	CHE 308, ENGR 102L	CHE 554
16–17	CHE 420	CHE 308	CHE 554

<sup>1</sup>CHE 307: Process Modeling I, CHE 308: Process Modeling II, CHE 420: Process Systems Engineering, CHE 332: Chemical Engineering Laboratory I, CHE 337: Chemical Engineering Laboratory, CHE 502: Mathematical Methods in Chemical Engineering, CHE 513: Chemical Process Thermodynamics, CHE 554: Process Systems Engineering, ENGR 101: Freshman Engineering Design I Laboratory, ENGR 102: Freshman Engineering Design II Laboratory, ENGR 103: Freshman Engineering Design III Laboratory



59. Member of International Programming Committee for ADCHEM 2018, 25-27 July 2018, Shenyang, China
58. Guest Editor, “Polymer Modeling, Control and Monitoring” Special Issue of Processes,” 2016
57. Member of the Technical Advisory Committee of CPC 2017
56. 2015 NSF Proposal Review Panel on BigData
55. 2015 NSF EPMD (Electronics, Photonics & Magnetic Devices) on Photovoltaic Solar Cells Proposal Review Panel
54. 2014 NSF Energy for Sustainability Proposal Review Panel on Solar Photovoltaics
53. Associate Editor for Invited Sessions at 2015 American Control Conference
52. AIChE Director on American Automatic Control Council Board, 2010–2013
51. Associate Editor for TC 6.1: Chemical Process Control, 2014 IFAC World Congress
50. 2014 NSF Energy for Sustainability – Solar Photovoltaics Proposal Review Panel I
49. 2013 NSF CAREER Energy for Sustainability Proposal Review Panel
48. 2013 NSF Energy for Sustainability – Photovoltaics Proposal Review Panel
47. Chair of the American Automatic Control Council Award Subcommittee for The O. Hugo Schuck Best Paper Awards at 2013 American Control Conference
46. 2012 NSF CMMI Control Systems Program Proposal Review Panel
45. Chair of the American Automatic Control Council Award Subcommittee for The O. Hugo Schuck Best Paper Awards at 2012 American Control Conference
44. Chair of the American Automatic Control Council Award Subcommittee for The O. Hugo Schuck Best Paper Awards at 2011 American Control Conference
43. Member of Program Committee, Chemical Process Control VIII, 2011
42. 2011 NSF CDI I Proposal Review Panel
41. Member of Program Committee, 2010 American Control Conference
40. Associate Editor for Invited Papers, 2010 American Control Conference
39. Associate Editor for SIAM Invited Papers, 2010 American Control Conference
38. 2010 NSF CDI II Proposal Review Panel
37. Member of the International Programming Committee of 2010 DYCOPS (DYnamics and COntrol of Process Systems)
36. Chair of the American Automatic Control Council Award Subcommittee for The O. Hugo Schuck Best Paper Awards at 2010 American Control Conference

35. Chair of the American Automatic Control Council Award Subcommittee for The O. Hugo Schuck Best Paper Awards at 2009 American Control Conference
34. AIChE Alternate Director on American Automatic Control Council Board, 2009–2010
33. Member of the 2009 AIChE National Programming Committee
32. Associate Editor, 2009 American Control Conference
31. AIChE Society Review Chair for 2009 American Control Conference
30. AIChE CAST 10B Programming Coordinator for 2009
29. International Program Committee of IFAC ADCHEM 2009
28. Chair of the American Automatic Control Council Award Subcommittee for The O. Hugo Schuck Best Paper Awards at 2008 American Control Conference
27. Associate Editor, 2008 American Control Conference
26. 2008 American Control Conference Program Committee
25. 2007 NSF SBIR/STTR Phase I Proposal Review Panel, Sensors for Infrastructure
24. 2007 CBET NSF Proposal Review Panel
23. 2007 NSF SBIR/STTR Phase II Proposal Review Panel, Fuel Cells
22. EPA Proposal Review Panel: The 4th Annual P3 Awards: A National Student Design Competition for Sustainability Focusing on People, Prosperity, and the Planet, 2007
21. 2007 NSF SBIR/STTR Phase I Proposal Review Panel, Light Management I
20. Associate Editor for Invited Papers, 2007 American Control Conference
19. 2007 American Control Conference Program Committee
18. 2006 CBET NSF CAREER Proposal Review Panel
17. 2006 NSF CAREER Proposal Review Panel
16. DOE Workshop to Identify R&D Topics on Inferential Process Control, Columbia, MD, March 2006
15. 2006 NSF SBIR/STTR Phase I Review Panel, Fuel Cells II
14. 2006 O. Hugo Schuck Best Paper Award Committee, American Automatic Control Council
13. International Program Committee of the Seventh IFAC Symposium on Advanced Control of Chemical Processes (ADCHEM 2006), Gramado, Brazil
12. 2005 O. Hugo Schuck Best Paper Award Committee, American Automatic Control Council

11. National Organizing Committee of the 7th International Symposium on Dynamics and Control Process Systems (DYCOPS-7), Cambridge, MA, 2004
10. 2004 American Control Conference Program Committee
9. 2003 EPA/NSF TSE Review Panel, Reaction Engineering
8. International Program Committee of the 2003 International Symposium on Advanced Control of Chemical Processes, Hong Kong, China
7. NSF Workshop on Future Directions in Nano-Scale Systems, Dynamics and Control in Denver, Colorado, June 3, 2003
6. 2003 American Control Conference Program Committee
5. 2002 NSF SBIR/STTR Phase I Review Panel, Process and Reaction Engineering
4. 2001 NSF SBIR/STTR Phase I Review Panel, Combustion and Plasma Systems/Chemical Process Design and Control
3. 2001 American Control Conference Program Committee
2. 2000 American Control Conference Program Committee
1. 1998 American Control Conference Program Committee

## 10.2 Conferences Organized/Co-organized

1. 2001 East Coast Academy of Process System Engineers Conference, Drexel University, Philadelphia, PA (May 2001)

## 10.3 Sessions Organized/Chaired

54. Chair, “Modeling and Computation in Energy and Environment,” *AIChE Annual Meeting*, November 2017
53. Chair, “Grand Challenge: Bio and Pharma,” *2017 Joint Foundations of Computer-Aided Process Operations (FOCAPO) / Chemical Process Control (CPC) XI*, Loews Ventana Canyon Hotel and Resort, Tucson, Arizona, January 2017
52. Organizer and Chair, “Control and Analysis of Energy Generation and Storage Systems,” *American Control Conference*, June 2013
51. Organizer and Chair, “Energy Generation, Storage and Integration Systems,” *American Control Conference*, June 2012
50. Chair, “Advances In Process Control,” *AIChE Annual Meeting*, November 2011
49. Organizer and Chair, “Modeling and Control of Energy Generation and Storage Systems,” *American Control Conference*, June 2011
48. Chair, “Process Control Applications,” *AIChE Annual Meeting*, November 2010

47. Chair, “Poster Session: Topics in Systems and Control,” *AIChE Annual Meeting*, November 2009
46. Co-Chair, “Estimation I,” *American Control Conference*, June 2009
45. Co-Chair, “Fault Detection and Isolation,” *AIChE Annual Meeting*, November 2008
44. Co-Chair, “Poster Session: Topics in Systems and Control,” *AIChE Annual Meeting*, November 2008
43. Co-Chair, “Predictive Control for Linear Systems,” *American Control Conference*, June 2008
42. Chair, “Optimal Control,” *American Control Conference*, June 2008
41. Chair, “Advanced Process Control I,” *AIChE Annual Meeting*, November 2007
40. Chair, “Advanced Process Control II,” *AIChE Annual Meeting*, November 2007
39. Co-Chair, “Optimization of Power Systems,” *American Control Conference*, July 2007
38. Chair, “Stabilization of Power Systems,” *American Control Conference*, July 2007
37. Chair, “Predictive Control of Nonlinear Systems,” *American Control Conference*, July 2007
36. Chair, “Nonlinear Control Design, Analysis and Applications,” *AIChE Annual Meeting*, November 2006
35. Chair, “Modeling and Control of Biological Processes,” *American Control Conference*, June 2006
34. Chair, “Process Control Applications,” *AIChE Annual Meeting*, November 2005
33. Chair and Organizer, “Batch Control,” *American Control Conference*, July 2005
32. Chair, “Fault Detection and Monitoring,” *7th International Symposium on Dynamics and Control Process Systems*, Boston, MA, July 2004
31. Co-Chair, “Linear Model Predictive Control I,” *American Control Conference*, July 2004
30. Chair, “Nonlinear Model Predictive Control,” *American Control Conference*, July 2004
29. Co-Chair, “Stochastic Methods,” *American Control Conference*, July 2004
28. Chair, “Control of Hybrid Systems,” *AIChE Annual Meeting*, November 2003
27. Chair and Organizer, “Process Quality Control,” *American Control Conference*, June 2003
26. Chair, “Constrained Nonlinear Systems II,” *American Control Conference*, June 2003
25. Chair, “Diagnosis and Fault Detection,” *American Control Conference*, June 2003

24. Chair, “Product Quality Control and Estimation,” *AIChE Annual Meeting*, November 2002
23. Chair, “Chemical Process Identification,” *American Control Conference*, May 2002
22. Chair and Organizer, “Control and Monitoring of Product Quality,” *American Control Conference*, May 2002
21. Co-chair and Co-organizer, “Advanced Control and Monitoring of Batch, Semi-batch, and Periodic Processes,” *American Control Conference*, June 2001
20. Chair, “Robust Process Control,” *6th IFAC Symposium on Advanced Control of Chemical Processes (ADCHEM)*, Pisa, Italy, June 2000
19. Chair, “Process Modeling, Identification, and Estimation I,” *AIChE Annual Meeting*, November 1999
18. Chair, “Process Modeling, Identification, and Estimation II,” *AIChE Annual Meeting*, November 1999
17. Chair, “Estimation: Linear and Nonlinear,” *American Control Conference*, June 1999
16. Chair, “Nonlinear Systems with Input Saturation,” *American Control Conference*, June 1999
15. Organizer, “Inferential and Product Quality Control,” *American Control Conference*, June 1999
14. Chair and Organizer, “Control and Monitoring of Polymerization Processes I,” *American Control Conference*, June 1999
13. Organizer, “Control and Monitoring of Polymerization Processes II,” *American Control Conference*, June 1999
12. Chair, “Batch Process Control,” *AIChE Annual Meeting*, November 1998
11. Chair and Organizer, “Control and Monitoring of Polymerization Processes I,” *American Control Conference*, June 1998
10. Chair and Organizer, “Control and Monitoring of Polymerization Processes II,” *American Control Conference*, June 1998
9. Co-chair, “Nonlinear Robust Control,” *American Control Conference*, June 1998
8. Chair, “Nonlinear Control,” *AIChE Annual Meeting*, November 1997
7. Chair and Organizer, “Control and Monitoring of Polymer Processes,” *American Control Conference*, July 1997
6. Co-chair, “Process Performance Monitoring,” *AIChE Annual Meeting*, November 1996
5. Co-chair, “Control of Polymer Processes,” *IFAC World Congress*, July 1996
4. Co-chair, “Nonlinear Process Control,” *AIChE Annual Meeting*, November 1995

3. Co-chair, “Process Control,” IEEE Conference on Control Applications, September 1995
2. Co-chair and Organizer, “Nonlinear Process Control Applications,” *American Control Conference*, July 1995
1. Co-chair, “Process Control Applications,” *American Control Conference*, July 1994

## 10.4 Books Reviewed

1. *Process Control and Management*, P. L. Lee, R. B. Newell, and I. T. Cameron, Blackie Academic & Professional, New York, N.Y. (1998); reviewed for *Chem. Eng. Sci.* (1999)

## 10.5 Proposals/Papers Reviewed for

- Funding Agencies
  - U.S. National Science Foundation
  - U.S. National Research Council
  - U.S. Environmental Protection Agency
  - U.S. Department of Energy
  - Drexel 2017 Scholarly Materials & Research Equipment Awards for Tenure/Tenure-Track Faculty
  - Kuwait Foundation for the Advancement of Sciences
  - Petroleum Research Fund
  - University of California Energy Institute
  - New Jersey Center for Energy, Economic, and Environmental Policy, Rutgers University
- Journals and Conferences
  - AIChE Journal
  - AIChE Annual Meetings
  - American Control Conferences
  - Applied Energy
  - Automatica
  - Canadian Journal of Chemical Engineering
  - Chemical Engineering and Processing
  - Chemical Engineering Education
  - Chemical Engineering Journal
  - Chemical Engineering Research and Design
  - Chemical Engineering and Processing: Process Intensification
  - Chemical Engineering Science

- Chemical Process Control
- Computers and Chemical Engineering
- Control Engineering Practice
- Engineering Applications of Artificial Intelligence
- European Control Conference
- European Journal of Control
- High Performance Polymers
- IEEE Conference on Decision and Control
- IEEE Control Systems Magazine
- IEEE Multi-conference on Systems and Control
- IEEE Transactions on Automatic Control
- IEEE Transactions on Automation Science and Engineering
- IEEE Transactions on Control Systems Technology
- IEEE Transactions on Robotics and Automation
- IFAC Conferences and Congresses
- Industrial and Engineering Chemistry Research
- International Journal of Adaptive Control and Signal Processing
- International Journal of Chemical Reactor Engineering
- International Journal of Control
- International Journal of Hydrogen Energy
- International Journal of Robust and Nonlinear Control
- IFAC Workshop on Control of Transmission and Distribution Smart Grids – CTDSG'16 at 11 - 13 October 2016 in Prague, Czech Republic
- 6th IFAC Conference on Foundations of Systems Biology in Engineering Submission, October 9-12, 2016 Magdeburg, Germany
- International Symposium on Dynamics and Control Process Systems (DYCOPS)
- IFAC Symposium on Advanced Control of Chemical Processes (IFAC-ADCHEM)
- IFAC Symposium on Nonlinear Control Systems (IFAC-NOLCOS)
- Iranian Journal of Electrical and Computer Engineering
- ISA Transactions
- Journal of Control and Intelligent Systems
- Journal of Control Practice
- Journal of Dynamic Systems Measurements, and Control
- Journal of Engineering Education
- Journal of Mathematical Control Science and Applications
- Journal of Molecular Structure
- Journal of Optimal Control Applications and Methods

- Journal of Process Control
- Korean Journal of Chemical Engineering
- Macromolecules
- Macromolecular Symposia
- Materials Chemistry and Physics
- Nonlinear Dynamics
- Polymer
- Polymer Science
- Polymer Engineering and Science
- Powder Technology
- Materials Chemistry and Physics
- Systems & Control Letters
- Solar Energy
- Solar Energy Materials and Solar Cells

## 10.6 Consulting

5. Near-Miss Management LLC  
“Probabilistic Analyses”  
8/2011–Present
4. Prime Synthesis, Inc., PA  
“Chemical Production Scaleup”  
3/2002–1/2003
3. DuPont Experimental Station, DE and Marshall Laboratory, PA  
“Polymerization Reactor Modeling, Optimization and Control”  
8/1997–3/2012
2. Rohm and Haas, Bristol, PA  
“Parameter Estimation in Polymerization Reactors”  
1/1996–5/1999
1. Lawrence Berkeley National Laboratory  
“Synthesis of Neural-Network Model-Based Controllers for Fluid Injection Processes”  
1996–1998

## 11 Students/Research Assistants Supervised

### 11.1 Ph.D.

18. Dr. Sairam Valluri, *Nonlinear Control of Processes with Actuator Saturation* (March 1997); currently Associate Director, Productivity, Praxair, Inc. NAIG–South Region



17. Dr. Srinivas Tatiraju, *Studies in Nonlinear State and Parameter Estimation* (November 1997); currently Development Manager, Dynamic Simulation Suite of Products, Invensys Development Centre India Pvt. Ltd, Hyderabad, India
16. Dr. Neeraj Zambare, *Studies in Robust Estimation and Control* (June 2001); currently Senior Process Consultant at Kongsberg Process Simulation, Inc., Houston, TX
15. Dr. Jashua M. Kanter (co-advised with Professor W. D. Seider at the University of Pennsylvania), *Model-based Control of Non-Minimum-Phase Nonlinear Processes* (September 2001); currently Postdoctoral Fellow in the Department of Medicine at the University of Massachusetts Medical School, Worcester, MA
14. Dr. Nasir Mehranbod, *A Probabilistic Approach for Sensor Fault Detection and Identification* (November 2002); currently Assistant Professor of Chemical Engineering at Shiraz University, Iran
13. Dr. Congling Quan, *High-Temperature Free-Radical Polymerization of n-Butyl Acrylate and Ethyl Acrylate* (December 2002); currently Senior Process Engineer at Unilever Research and Development, Trumbull, CT.
12. Dr. Chanin Panjapornpon, *Model-Based Controller Design for General Nonlinear Processes* (December 2005); currently Assistant Professor of Chemical Engineering at Kasetsart University, Thailand
11. Dr. Felix Rantow, *Secondary Reactions in High-Temperature Free-Radical Polymerization of Alkyl Acrylates* (August, 2006); currently Process Consultant/Process Simulation Engineer, Kongsberg Process Simulation, Inc., Houston, TX
10. Dr. Sriraj Srinivasan, *Molecular Simulation Studies in High-Temperature Polymerization* (August 2009); currently a Scientist in the Analytical and Systems Research Group, Arkema, King of Prussia, PA
9. Dr. Mona Bavarian, *Mathematical Modeling and Analysis of Solid Oxide Fuel Cells and a Dye Sensitized Solar Cell* (June 2012); currently an Advanced Manufacturing Process Engineer at Brewer Science, Inc., Rolla, MO
8. Dr. Nazanin Moghadam, *Theoretical/Computational Study of Transfer Reactions in Free-Radical Polymerization of Alkyl Acrylates* (March 2015), Terra Pacific Group in San Francisco, CA
7. Taha Mohseni, *Dynamic Risk Assessment in the Process Industries* (December 2015), Postdoctoral Research Associate, Temple University, Philadelphia, PA
6. David Hitchcock, *Synthesis of Specialty Polymers for Novel Applications*
5. Yuriy Smolin, *Mathematical Modeling, Design Optimization and Synthesis of Solar Cells* (August 2017)
4. Debashis Kundu, *Multiscale Mathematical Modeling, Design Optimization and Control of Nanostructures*
3. Ahmad Arabi Shamsabadi, *Molecular Design, Synthesis and Characterization of Macromonomers, Polymer Synthesis and Characterization, and Membrane Fabrication and Testing* (August 2019)

2. Hossein Riazi, *Environmentally Friendly Resins and Coatings for Automobile Applications*
1. Brandon Wong, *Big-Data Modeling and Inference*

## 11.2 M.S.

20. Michelle DiBruno, *Isomerization of Butane* (June 1999)
19. Frank D. Witulski, *Cracking Hydrocarbon Molecules by Micro-Organisms* (June 1999)
18. Timothy Handa, *Mathematical Modeling and Control of Crystallization Processes* (June 2000), currently a Senior Engineer at Crest Foam, Moonachie, NJ
17. Neeraj Zambare, *Studies in Robust Estimation and Control* (March 2001); currently a Process Engineer at Kamdar Simulation Services, Houston, TX
16. Dwayne Tyner, *Mathematical Modeling, Optimization, and Control of a Semi-batch Polymerization Reactor* (June 2001); currently a Senior Engineer at General Electric, King of Prussia, PA
15. Dhaval N. Gosalia, *Enzyme Assay Microarray for Fluorogenic Reactions*, co-advised with Scott Diamond of University of Pennsylvania, PA (June 2001); currently pursuing a Ph.D. degree at University of Pennsylvania
14. Chanin Panjapornpon, *Studies in Model Identification and Control of a Liquid Level and Temperature Process* (March 2002)
13. Brad Holtstine (co-advised with Dr. M. C. Grady at DuPont's Marshall Laboratory), *Experiments in High-Temperature Free-Radical Polymerization* (June 2002)
12. Congling Quan, *High Temperature Free-Radical Polymerization* (June 2002)
11. Kristin Grenkevich, *Scale-up of a Sensitive Chemical Reaction Process* (September 2003)
10. Kung-Chen Jou, *Studies in Fault Detection and Estimation* (September 2003)
9. Theodore Fisher, *Control of a Highly Exothermic Reactor* (September 2003)
8. Felix Rantow, *Numerical Simulation of High-Temperature Polymerization Reactors* (December 2005)
7. Swa Metta, *Instrument Fault Detection and Identification in Distributed Systems* (March 2005); Currently a Quality Analyst at Software Catalysts LLC
6. Kevin Falciani, *Feedback Control of 1,4-Dioxane Concentration in a Sulfonated/Sulfated Neutralization Process* (September 2006)
5. Nicole Carlucci, *Dimensional Inspection of Contoured Composite Parts Using Valisys Analysis* (September 2006)
4. Yashar Hajimolana, *Mathematical Modeling of a Tubular Solid Oxide Fuel Cell* (September 2008)

3. An Du, *Mathematical Modeling of a High-Temperature Polymerization Reactor* (September 2008)
2. Steven Kelley, *Mathematical Modeling of a Solid Oxide Fuel Cell* (September 2012)
1. Steven Farrell *Mathematical Modeling and Synthesis of a Solar Cell* (September 2013)

### 11.3 B.S.

19. Kimberly A. Boyle, *A Software for Nonlinear Controller Synthesis* (June 1994)
18. Emad Saad, *Windup Compensation in Conventional Control* (June 1995)
17. John Grantz, *Windup Compensation in Model-Based Control* (February 1996)
16. George Katsikis, *Windup Compensation in Cascade Control* (June 1996)
15. Christopher S. Vales, *An Experimental Apparatus for Process Control* (June 1997)
14. Nathan W. Fletcher, *An Experimental Setup for Process Control* (November 1998)
13. My Tran, *Destruction of Hydrocarbon Molecules by Micro-Organisms* (June 1999)
12. Roberto Pina, *A Computer Code for Data Acquisition* (June 2000)
11. Michael Faia, *Mathematical Modeling of a Biomedical Process* (June 2002)
10. Shagoftah Rahman, *Control of a Chemical Process with Chaotic Behavior* (June 2002)
9. Mohammad Haghkar, *Development of Software for Controller Synthesis* (June 2003)
8. Agnieszka Kazmierczuk, *Mathematical Modeling of Glucose Concentration in Blood* (June 2003)
7. Omari Ansong, *High-Temperature Polymerization Modeling* (September 2004)
6. Dan Hollenbach, *Control Strategies for a Polymerization Reactor* (June 2003)
5. Casey McNamara, *Mathematical Modeling of a Solid-Oxide Tubular Fuel Cell* (2006)
4. Steven Kelley, *Mathematical Modeling of a Solid Oxide Fuel Cell* (September 2012)
3. Steven Farrell, *Mathematical Modeling and Synthesis of a Solar Cell* (September 2013)
2. Anthony Durbano, *Mathematical Modeling of a Flow Battery* (September 2013)
1. Yifang Wang, *Spontaneous Free-radical Polymerization of Methyl Acrylate* (September 2016)

## 11.4 Postdoctoral Fellows/Visiting Scholars

5. Dr. Sairam Valluri, Postdoctoral Research Fellow (March 1997–March 1998)
4. Dr. S. Mehdi Alaie, Visiting Scholar (June 1999–June 2000)
3. Dr. Nasir Mehranbod, Postdoctoral Research Fellow (2002–2003)
2. Dr. Sriraj Srinivasan, Postdoctoral Research Fellow (2009–2010)
1. Dr. Mona Bavarian, Postdoctoral Research Fellow (2012–2012)

## 12 Additional Drexel University Services

42. One of the three Senior Leaders of the Drexel Strategic Plan Task Force for Student Lifecycle Management, 2017–present
41. Co-chair, Drexel Strategic Plan Implementation Committee (Dealing with Research), 2017–present
40. Drexel Faculty Representative at the Federal Demonstration Partnership (FDP) Meetings
39. Chair of Chemical and Biological Engineering Awards Committee, 2013–present
38. Chair of Senate Committee on Research and Scholarly Activity, 2014–present
37. Member of Provost Advisory Committee on Tenure and Promotion, 2017–present
36. Member of the Provost Award for Outstanding Scholarly Productivity Committee, 2017
35. Chair of the Faculty Promotion Committee of Dr. Jason Baxter, Department of Chemical and Biological Engineering, Drexel University, 2017
34. Chair of the Faculty Midterm Review Committee of Dr. Nickolas Alvarez, Department of Chemical and Biological Engineering, Drexel University, 2017
33. Chair of the Faculty Midterm Review Committee of Dr. Maureen Tang, Department of Chemical and Biological Engineering, Drexel University, 2017
32. Chair of the Faculty Midterm Review Committee of Dr. Joshua Snyder, Department of Chemical and Biological Engineering, Drexel University, 2017
31. Member of the Faculty Promotion Committee of Dr. Steve P. Wrenn, Department of Chemical and Biological Engineering, Drexel University, 2016
30. Chair of the Faculty Tenure and Promotion Committee of Dr. Vibha Kalra, Department of Chemical and Biological Engineering, Drexel University, 2015
29. Chair of College of Engineering Senate Nomination and Selection Committee, 2010–2014
28. Member of College of Engineering Executive Advisory Committee, 2004–2014

27. Member of the Faculty Promotion Committee of Dr. Steve P. Wrenn, Department of Chemical and Biological Engineering, Drexel University, 2012
26. Chair of the Faculty Promotion Committee of Dr. Yousef Elabd, Department of Chemical and Biological Engineering, Drexel University, 2012
25. Chair of the Faculty Tenure and Promotion Committee of Dr. Kenneth Lau, Department of Chemical and Biological Engineering, Drexel University, 2011
24. Member of the Faculty Promotion Committee of Dr. Cameron Abram, Department of Chemical and Biological Engineering, Drexel University, 2011
23. Chair of the Faculty Tenure and Promotion Committee of Dr. Yousef Elabd, Department of Chemical and Biological Engineering, Drexel University, 2008
22. Member of College of Engineering Senate Selection and Nomination Committee, 2004–07
21. College of Engineering Senator, 2004–2007
20. Member of Graduate Program Committee, Department of Chemical and Biological Engineering, Drexel University, 1994–2008
19. Member of the Faculty Promotion Committee of Dr. Nily Dan, Department of Chemical and Biological Engineering, Drexel University, 2007
18. Member of the Faculty Tenure and Promotion Committee of Dr. Cameron Abrams, Department of Chemical and Biological Engineering, Drexel University, 2007
17. Member of the Faculty Promotion Committee of Dr. Anthony Lowman, Department of Chemical and Biological Engineering, Drexel University, 2006
16. Chair of Faculty Search Committee, Department of Chemical Engineering, Drexel University, 2005–2006
15. Chair of the Faculty Tenure and Promotion Committee of Dr. Steve P. Wrenn, Department of Chemical Engineering, Drexel University, 2004
14. Member of the Faculty Tenure and Promotion Committee of Dr. Giuseppe Palmese, Department of Chemical Engineering, Drexel University, 2004
13. Interim Graduate Program Advisor, Department of Chemical Engineering, Drexel University, 2004–05
12. Member of Department-Head Search Committee, Department of Chemical Engineering, Drexel University, 2004
11. Graduate Program Advisor, Department of Chemical Engineering, Drexel University, 1994–2003
10. Chair of Graduate Program Committee, Department of Chemical Engineering, Drexel University, 1998–2003, 2004–05
9. Member of College of Engineering Graduate Committee, Drexel University, 1994–2002

8. Member of the Faculty Performance Review Committee of Dr. Cameron Abrams, Department of Chemical Engineering, Drexel University, 2005
7. Member of the Faculty Performance Review Committee of Dr. Steve P. Wrenn, Department of Chemical Engineering, Drexel University, 2001
6. Member of the Faculty Performance Review Committee of Dr. Richard Cairncross, Department of Chemical Engineering, Drexel University, 1999
5. Faculty Mentor, Department of Chemical Engineering, Drexel University, 1999–2005
4. Chair of the Faculty Tenure and Promotion Committee of Dr. Anthony Lowman, Department of Chemical Engineering, Drexel University, 2000
3. Member of the Faculty Tenure and Promotion Committee, Department of Chemical Engineering, Drexel University, 1999–2000
2. Chair of Faculty Search Committee, Department of Chemical Engineering, Drexel University, 1999–2000
1. Member of College of Engineering Computer Committee, Drexel University, 1994–1996

## **13 Membership in Professional & Honorary Societies**

- Fellow of American Institute of Chemical Engineers (AIChE)
- Senior Member of Institute of Electrical and Electronics Engineers (IEEE)

## **14 Last Revision Date**

- December 13, 2017