Curriculum Vitae: **Prof. Richard D. Braatz, Edwin R. Gilliland Professor**
Massachusetts Institute of Technology
77 Massachusetts Avenue, Cambridge, MA 02139
Voice: +1-617-253-3112, Fax: +1-617-258-0546
E-mail: braatz@mit.edu, http://web.mit.edu/braatzgroup

I. PERSONAL HISTORY AND PROFESSIONAL EXPERIENCE

A. Education
California Institute of Technology, Ph.D., Chemical Engineering, 1993
California Institute of Technology, M.S., Chemical Engineering, 1991
Oregon State University, B.S. with Honors, Chemical Engineering, 1988

B. Honors and Awards (Google Scholar h-index ≥ 50, total citations ≥ 10,000)
Excellence in Education Award, International Society of Automation, 2015
Outstanding Reviewer, Chemical Engineering Science, 2015
AIChE CAST Computing in Chemical Engineering Award, 2014
AIChE PD2M Award for Outstanding Contribution to QbD for Drug Substance, 2013
Excellence in Technical Innovation Award, International Society of Automation, 2013
Distinguished Lecturer, IEEE Control Systems Society, 2013-date
Academy of Distinguished Engineers, Oregon State University, 2012
Control Systems Society Transition to Practice Award, Institute of Electrical and Electronics
    Engineers, 2011
Edwin R. Gilliland Professor of Chemical Engineering, MIT, 2010-date
Research Collaboration Award, The Council for Chemical Research, 2009
Fellow, American Association for the Advancement of Science, 2008
Journal of Process Control Prize Paper Award (for IEE/methodology), 2008
Journal of Process Control Prize Paper Award (for a survey), 2008
Fellow, International Federation of Automatic Control, 2008
Fellow, Institute of Electrical and Electronics Engineers, 2007
AIChE Excellence in Process Development Research Award, 2006
Millennium Chair of Chemical and Biomolecular Engineering, UIUC, 2006-2010
Lindsay Distinguished Lecturer, Texas A&M University, 2005-2006
Antonio Ruberti Young Researcher Prize, Institute of Electrical and Electronics Engineers, 2005
IEEE Transactions on Control Systems Technology Outstanding Paper Award, 2005
CAST Outstanding Young Researcher Award, American Institute of Chemical Engineers, 2005
Curtis W. McGraw Research Award, American Society for Engineering Education, 2004
CAST Directors' Award, American Institute of Chemical Engineers, 2003
University Scholar, University of Illinois, 2002-2005
Beckman Associate, UIUC Center for Advanced Study, 2002
Ernest W. Thiele Lectureship, University of Notre Dame, 2001
Collins Fellow, UIUC College of Engineering, 2001
Best Referee Award, Journal of Process Control, 2000
Donald P. Eckman Award, American Automatic Control Council, 2000
Council of Outstanding Early Career Engineers, Oregon State University, 2000

Dean's Teaching Fellow, UIUC College of Liberal Arts and Sciences, 2000
Xerox Award for Faculty Research, UIUC College of Engineering, 1999
Advisors List for Advising Excellence, UIUC College of Engineering, 1999, 2002
Outstanding Reviewer, Automatica, 1999, 2002
Teaching Excellence Award, UIUC School of Chemical Sciences, 1997
DuPont Young Faculty Award, 1995
Hertz Doctoral Thesis Prize, John and Fannie Hertz Foundation, 1994
American Control Conference Presentation Award, 1993, 2013, 2014
Hertz Fellow, 1991

C. List of Academic Positions since Final Degree

Affiliate Faculty, MIT Center for Computational Engineering, 2015-date
Adjunct Professor, KAIST, 2013-date
Affiliate Faculty, Center for Biomedical Innovation, Massachusetts Institute of Technology, 2013-date
Affiliate Faculty, MIT Energy Initiative, 2011-date
Edwin R. Gilliland Professor of Chemical Engineering, Massachusetts Institute of Technology, 2010-date
Adjunct Professor, Department of Chemical and Biomolecular Engineering, UIUC, 2010-date
Adjunct Professor, Department of Electrical and Computer Engineering, UIUC, 2010-date
Visiting Scholar, School of Engineering and Applied Sciences, Harvard University, 2009-2010
Affiliate Faculty, Institute for Advanced Computing Applications and Technologies (IACAT), UIUC, 2008-2012
Lead, Research Project on Multiscale Simulation in Science and Engineering, IACAT, UIUC, 2008-2012
Affiliate Faculty, Institute for Genomic Biology, Regenerative Biology and Tissue Engineering Theme, UIUC, 2006-2010
Millennium Chair of Chemical and Biomolecular Engineering, UIUC, 2006-2010
Affiliate Faculty, Department of Mechanical Science and Engineering, UIUC, 2006-2010
Affiliate Faculty, Department of Electrical and Computer Engineering, UIUC, 2005-2010
Affiliate Faculty, Department of Mechanical and Industrial Engineering, UIUC, 2005-2006
Affiliate Faculty, Department of Bioengineering, UIUC, 2004-2010
Affiliate Faculty, Beckman Institute for Advanced Science and Technology, Molecular and Electronic Nanostructures Area, UIUC, 2004-2010
Applied Mathematics Faculty, UIUC, 2003-2012
Research Faculty, Center for Nanoscale Science and Technology, UIUC, 2003-date
Visiting Professor of Chemical Engineering, Massachusetts Institute of Technology, 2002-2003
Professor of Chemical and Biomolecular Engineering, UIUC, 2002-2010
Beckman Associate, Center for Advanced Study, UIUC, 2001-2002
Affiliate Faculty, Bioengineering Program, UIUC, 2000-2004
Associate Professor of Chemical Engineering, UIUC, 2000-2002
Affiliate Faculty, Biotechnology Center, UIUC, 2000-2010
Senior Research Scientist, National Center for Supercomputing Applications (NCSA), UIUC, 1997-2002
Local Anchor, Chemical Engineering Applications Team, NCSA, UIUC, 1997-2000
Computational Science and Engineering Faculty, UIUC, 1995-2012

Assistant Professor of Chemical Engineering, UIUC, 1994-2000

D. Other Professional Employment (not including consulting)
Visiting Research Scientist, DuPont Company, Wilmington, DE, 1993-1994
Visiting Research Scientist, Norwegian University of Science and Technology, Trondheim, 1993
Research Engineer, Chevron Research Company, Richmond, CA, 1988

E. Invited Lectures
1. Avery-Dennison Research Center, Pasadena, California, 1991.
2. Department of Chemical Engineering, Graduate Student Seminar Series, California Institute of Technology, Pasadena, California, 1992.
3. Department of Chemical Engineering, The Ohio State University, Columbus, OH, 1993.
4. Department of Chemical Engineering, University of Massachusetts, Amherst, MA, 1993.
5. Department of Chemical Engineering, University of Illinois, Urbana, IL, 1993.
6. Department of Chemical Engineering, Case Western Reserve University, Cleveland, OH, 1993.
7. Department of Chemical Engineering, Rice University, Houston, TX, 1993.
8. Department of Chemical Engineering, University of California, Berkeley, CA, 1993.
9. Department of Chemical Engineering, University of California, Santa Barbara, CA, 1993.
10. Department of Chemical Engineering, University of Pittsburgh, PA, 1993.
11. Department of Chemical Engineering, University of Trondheim, Norway, 1993.
12. Department of Control Engineering, University of Stuttgart, Germany, 1993.
13. Shell Westhollow Research Center, Houston, TX, 1993.
14. DuPont Experimental Station, Wilmington, DE, 1993.
15. 1st Annual Midwest Process Control Workshop, Systems and Control Center, School of Chemical Engineering, Purdue University, West Lafayette, IN, 1994.
16. DuPont Experimental Station, Wilmington, DE, 1994.
17. Decision and Control Laboratory, Coordinated Science Laboratory, University of Illinois, Urbana, IL, 1994.
18. International Paper Research Center, Mobile, AL, 1995.
19. Systems and Control Center, School of Chemical Engineering, Purdue University, West Lafayette, IN, 1995.
20. Weyerhaeuser Workshop on Modeling and Control of Kamyr Digesters and Paper Machines, Weyerhauser Research Center, Tacoma, WA, 1995.
21. Department of Chemical Engineering, University of Cincinnati, OH, 1996.
22. Complexity Seminar Series, Department of Mathematics, University of Illinois, Urbana, IL, 1997.
23. Merck Research Center, Rahway, NJ, 1997.
24. Centre National de la Recherche Scientifique (CNRS), Paris, France, 1997.
25. Department of Chemical Engineering, Northwestern University, Evanston, IL, 1998.
26. Merck Research Center, Rahway, NJ, 1998.
27. Center for Process Analytical Chemistry, University of Washington, Seattle, WA, 1998.
28. CIC TechForum98, Beckman Institute, University of Illinois, IL, 1998.
29. Department of Chemical Engineering, University of Notre Dame, IN, 1999.
30. Bristol-Myers Squibb Research Center, New Brunswick, NJ, 1999.
31. American Institute of Chemical Engineers (AIChE), Illinois Chapter, Champaign, IL, 1999.

32. Systems and Control Center, School of Chemical Engineering, Purdue University, West Lafayette, IN, 1999.
33. Refining Technology Group, Amoco Oil Company, BP Amoco, Naperville, IL, 1999.
34. Merck Research Center, Rahway, NJ, 1999.
35. University of Florida, Gainesville, FL, 2000.
36. FBRM Users Forum, Orlando, FL, 2000.
37. International Paper Technology Center, Cincinnati, OH, 2000.
38. Abbott Laboratories, Chicago, IL, 2000.
39. Science and Engineering Education Scholars Program Workshop, University of Illinois, Urbana, IL, 2000.
40. Control 2000 Symposium, University of Illinois, Urbana, IL, 2000.
41. Department of Chemical Engineering, National University of Singapore, Singapore, 2000.
42. DuPont Singapore, Singapore, 2000.
43. Glaxo Wellcome Manufacturing, Singapore, 2000.
44. Department of Chemical Engineering, National University of Singapore, Singapore, 2000.
45. Kyoto University, Kyoto, Japan, 2000.
46. International Paper Technology Center, Cincinnati, OH, 2000.
47. International Conference on Chemical Process Control 6, Tucson, Arizona, 2001.
48. NUS-UIUC Joint Symposium, Department of Chemical Engineering, National University of Singapore, Singapore, 2001.
49. Annual Conference for NSF K-12 Mathematics, Science, and Implementation Projects, Washington, DC, 2001.
50. Decision and Control Laboratory, Coordinated Science Laboratory, University of Illinois, Urbana, IL, 2001.
51. FBRM Users Conference, Barcelona, Spain, 2001.
52. Annual Meeting of the Association for Crystallization Technology, Northbrook, Illinois, 2001.
53. Department of Chemical Engineering, University of California at Los Angeles, 2001.
54. Merck Research Center, Rahway, NJ, 2001.
55. **Plenary Lecture**, American Control Conference, Arlington, Virginia, 2001.
56. International Conference on Materials for Advanced Technologies, Symposium D: Crystallization and Interfacial Processes, Singapore, 2001.
57. International Conference on Materials for Advanced Technologies, Symposium H: Materials Science and Engineering Education in New Millenium, Singapore, 2001.
58. GlaxoSmithKline, Singapore, 2001.
59. Department of Chemical and Process Engineering, University of Sheffield, UK, 2001.
60. 2nd Pan American Workshop on Process Systems Engineering, Guaruja, Brazil, 2001.
61. **Ernest W. Thiele Lecture**, "Advances in the Control of Complex Chemical Systems", University of Notre Dame, IN, 2001.
62. "ChemViz II: Chemistry Visualization," Supercomputing2001, Denver, CO, 2001.
63. "Advances in the Control of Complex Chemical Systems," Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA, 2001.
64. "Robust Identification and Control of Batch Processes," Process Design, Operations, and Control Seminar, Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA, 2001.

65. "Paracetamol Crystallization using FBRM and ATR-FTIR: Metastability and Agglomeration," FBRM Users Forum, Charleston, SC, 2002.
66. "Model Based Experimental Design and Optimization for Crystallization of a Pharmaceutical Compound," FBRM Users Forum, Charleston, SC, 2002.
67. "Challenges, Theory, and Applications of Process Control," Department of Chemical Engineering, University of South Carolina, Columbia, SC, 2002.
68. "Advances in the Control of Complex Chemical Systems," Department of Chemical Engineering, University of Massachusetts, Amherst, MA, 2002.
69. "Advances in the Control of Complex Chemical Systems," Chemical Process Modeling and Control Research Center, Lehigh University, Bethlehem, PA, 2002.
70. "Control of Sheet and Film Processes," Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA, October 18, 2002.
71. "Fault Detection and Diagnosis Applied to Whole Chemical Plants," United Technologies Corporation Fuel Cells, South Windsor, Connecticut, October 29, 2002.
72. "Theory and Practice of Fault Detection and Diagnosis," United Technologies Research Corporation, Connecticut, October 29, 2002.
73. "Systems Engineering of Nanomaterials Manufacturing Processes," Process Design, Operations, and Control Seminar, Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA, November 21, 2002.
74. "Advances in Crystallization Modeling and Control," Merck, Rahway, NJ, February 24, 2003.
75. "Fundamentals of Crystallization Control," Crystallization Training Seminar: Fundamentals of Batch Crystallization Design - A High-Tech Approach, Mettler-Toledo, New York, February 25, 2003.
76. "Measurement of Particle Size Distribution in Suspension Polymerization using Laser Backscattering and Process Video Microscopy," Lasentec Users Forum, New York, February 26, 2003.
77. "Control of Sheet and Film Processes," Systems Research Insititute, Polytechnic University, Brooklyn, NY, February 27, 2003.
78. "Advances in the Control of Particulate Processes," Department of Chemical Engineering, Chemistry, and Materials Science, Polytechnic University, Brooklyn, NY, February 28, 2003.
79. "Advances in the Control of Complex Chemical Systems," Department of Chemical Engineering, University of California at Santa Barbara, CA, April 17, 2003.
80. "Advances in Crystallization Modeling and Control," Sepracor, Inc., MA, May 20, 2003.
81. "Advances in Crystallization Control," Institute of Chemical and Engineering Sciences, Singapore, June 13, 2003.
82. **Keynote Lecture**, "Multiscale Systems Engineering with Applications to Electronics Devices," Center for Process Systems Engineering Inaugural Symposium, Georgia Institute of Technology, Atlanta, GA, September 9, 2003.
83. "Experimental Design and Control Strategies for Batch Crystallization," Annual Meeting of the Association for Crystallization Technology, Groton, CT, September 15-17, 2003.
84. "Multiscale Systems Engineering with Applications to Electronic Devices," Center for Nanoscale Science and Technology and Decision and Control Laboratory, Coordinated Science Laboratory, University of Illinois, Urbana, IL, October 8, 2003.

85. "Multiscale Systems Engineering with Applications to Microelectronics," Department of Chemical Engineering, University of Delaware, Newark, DE, December 5, 2003.

86. **Semi-plenary Lecture**, "Advances in the Modeling and Control of Batch Crystallizers," IFAC Symposium on Advanced Control of Chemical Processes, Hong Kong, January 14, 2004.

87. "Multiscale Systems and Control with Applications to Electronic Devices," Department of Chemical Engineering, National Taiwan University, Taipei, Taiwan, January 16, 2004.

88. "Multiscale Systems and Control," Center for Process Systems Engineering Consortium Meeting, Imperial College, London, United Kingdom, April 23, 2004.

89. "Advances in Crystallization Control," Bristol Myers Squibb Research Center, New Brunswick, NJ, June 10, 2004.

90. "Modeling and Control of Multiscale Systems," Annual Meeting of the McMaster Advanced Control Consortium, McMaster University, Canada, June 23, 2004.

91. **Keynote Lecture**, "Perspectives on the Dynamics and Control of Multiscale Systems," International IFAC Symposium on Dynamics and Control of Process Systems, Cambridge, MA, July 5-7, 2004.

92. "Multiscale Systems Theory with Application to Electronic Devices," Department of Chemical and Materials Engineering, University of Alberta, Edmonton, Canada, July 26-27, 2004.

93. "Advances in Crystallization using Laser Backscattering and ATR-FTIR Spectroscopy: Automation, Metastability, and Control," Institute of Chemical and Engineering Sciences, Singapore, August 6, 2004.

94. "New Technologies for the Modeling and Control of Industrial Crystallization," Kraft Foods, Chicago, IL, January 31, 2005.

95. "Uncertainty Quantification of Highly Nonlinear Processes," Laboratory for Product and Process Design, University of Illinois at Chicago, February 1, 2005.

96. "Multiscale Systems Theory with Applications to Microelectronic Devices," Illinois Institute of Technology, Chicago, IL, February 2, 2005.

97. "Multiscale Systems Theory with Applications to Microelectronic Processes," Ecole Polytechnique de Montréal, Quebec, Canada, February 17, 2005.

98. E. J. Hukkanen and R. D. Braatz, "Use of Process Analytical Technologies in Polymerization Processes," Mettler-Toledo AutoChem Real Time Analytics Users' Forum, New York, February 27-March 2, 2005.

99. "Chemometrics, Modeling, and Control in Pharmaceutical Crystallization," FDA Center for Drug Evaluation and Research, Department of Health & Human Services, U.S. Food and Drug Administration, Rockville, MD, March 29, 2005.

100. U. Ravaioli and R. D. Braatz, "Designing Simulations for Nanoscience Applications," National Center for Learning and Technology in Nanoscale Science and Engineering, webcast, May 16, 2005.

101. "Applications of Statistics to Multiscale Systems," Gordon Conference on Statistics in Chemistry and Chemical Engineering**,** Mount Holyoke College, South Hadley, MA, July 19, 2005.

102. "Applications of ATR-FTIR Spectroscopy and Laser Backscattering to the Design of Batch Crystallization Recipes," Annual Conference of the British Association for Crystal Growth, University of Sheffield, United Kingdom, September 4-6, 2005.

103. "Applications of ATR-FTIR Spectroscopy and Laser Backscattering to the Design of Batch Crystallization Recipes," AstraZeneca, Loughborough, United Kingdom, September 7, 2005.
104. "Applications of Statistics to Multiscale Systems," SIGENE, Norwegian University of Life Sciences, Ås, Norway, October 24, 2005.
105. **Annual Industry Lecture**, "Modeling and Simulation of Multiscale Chemical Systems," Norwegian Chemical Society, Oslo, Norway, October 25, 2005.
106. "Applications of Statistics to Multiscale Chemical Systems," Norwegian University of Science and Technology, Trondheim, Norway, October 27, 2005.
107. "Multiscale Systems Theory with Microelectronics Applications," Department of Engineering Cybernetics, Norwegian University of Science and Technology, Trondheim, Norway, October 27, 2005.
108. Richard C. Alkire and Richard D. Braatz, "Multiscale Modeling and Experiments on the Effect of Additives on Shape Evolution during Electrodeposition," Joint National Institute for Nanotechnology/Center for Nanoscale Science and Technology Workshop, University of Illinois, October 31, 2005.
109. "Multiscale Systems Approach to Electrochemical Processes," Department of Chemical and Biomolecular Engineering, University of Pennsylvania, Philadelphia, PA, November 16, 2005.
110. "Multiscale Predictive Modeling of Complex Systems," University of Oklahama, Norman, OK, November 30, 2005.
111. "Multiscale Modeling of Complex Reacting Systems," School of Chemical, Biochemical, and Materials Engineering, University of Oklahoma, Norman, OK, December 1, 2005.
112. "Multiscale Simulation and Analysis of Microelectronics Processes," Lehrstuhl für Prozesstechnik, Aachen University, Germany, December 8, 2005.
113. "Multiscale Systems Theory with Applications to Microelectronic Processes," Engineering Cybernetics Seminar Series, University of Stuttgart, Germany, December 9, 2005.
114. "A Multiscale Systems Approach to Microelectronic Processes," International Conference on Chemical Process Control 7, Lake Louise, Alberta, Canada, January 9, 2006.
115. "Advances in Modeling, Monitoring, and Control of Pharmaceutical Crystallization," Schering-Plough Research Institute, Union, NJ, February 10, 2006.
116. "Multiscale Systems and Control," Symposium on Trends in Systems and Control Theory, Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg, Germany, March 1-2, 2006.
117. "Advances in Modeling, Monitoring, and Control of Pharmaceutical Crystallization," Global Pharmaceutical Research and Development, Abbott Laboratories, Illinois, March 7, 2006.
118. "A Multiscale Systems Approach to Microelectronic Processes," University of Loughborough, United Kingdom, March 27, 2006.
119. "Multiscale Modeling of Complex Reacting Systems," School of Chemical Engineering and Analytical Science, The University of Manchester, Manchester, United Kingdom, March 29, 2006.
120. **Distinguished Lecturer**, "Multiscale Systems Theory with Applications to Microelectronic Processes," Lindsay Lecture Series, Department of Chemical Engineering, Texas A&M University, College Station, TX, April 7, 2006.

121. "Modeling, Design, and Control of Multiscale Processes with Application to Batch Organic Crystallization," Process Chemistry & Engineering, Royal Society of Chemistry, Newcastle, United Kingdom, April 10, 2006.
122. "Multiscale Systems Theory with Microelectronics Applications," Ecole Polytechnique Lausanne, Switzerland, April 13, 2006.
123. "A Multiscale Systems Approach to Microelectronic Processes," Carnegie Mellon University, Pittsburgh, PA, April 25, 2006.
124. "Online Monitoring of Crystallization Processes with Application to Batch Recipe Design," Process Crystallization in the Pharmaceutical and Chemical Industry, American Chemical Society ProSpectives Series, Philadelphia, PA, April 26-27, 2006.
125. "Advances in Modeling, Monitoring, and Control of Pharmaceutical Crystallization," Sepracor, Inc., MA, May 8, 2006.
126. "Advances in Modeling, Monitoring, and Control of Pharmaceutical Crystallization," Eli Lilly, IN, May 23, 2006.
127. "Online Monitoring of Crystallization Processes with Application to Batch Recipe Design," TAP Pharmaceuticals, Lake Forest, IL, August 10, 2006.
128. "Modeling and Design of Multiscale Chemical Systems," WebCAST lecture, American Institute of Chemical Engineers, Computing and Systems Technology Division, September 29, 2006.
129. "Challenges in the Scale-up of Crystallization for Specialty Products from Laboratory R&D through to Manufacturing Scale," 14th Larson Workshop, Association for Crystallization Technology, Princeton, NJ, October 10, 2006.
130. "Design of Crystallization Processes from Laboratory R&D to the Manufacturing Scale," Crystallization Process Development: Case Studies & Research, American Chemical Society ProSpectives Series, Boston, MA, February 26, 2007.
131. "Design of Crystallization Processes from Laboratory R&D to the Manufacturing Scale," Crystallization Process Development: Case Studies & Research, Pfizer, Groton, CO, February 28, 2007.
132. "Control of Polymorphism," TAP Pharmaceuticals, Lake Forest, IL, May 23, 2007.
133. R. D. Braatz (speaker) and L. Goh, "Five Non-Intuitive Things about the Nanoscale," NCLT Center-wide Meeting, Northwestern University, Evanston, IL, May 25, 2007.
134. **Keynote Lecture**, Z. K. Nagy, M. Fujiwara, and R. D. Braatz, "Recent Advances in the Modelling and Control of Cooling and Antisolvent Crystallization of Pharmaceuticals," 8th International IFAC Symposium on Dynamics and Control of Process Systems, Cancun, Mexico, June 6-8, 2007.
135. "Modeling and Design of Multiscale Chemical Systems," Department of Chemical Engineering, University of Texas at Austin, September 11, 2007.
136. "Process Analytical Technology for Crystallization Processes," Process Analytical Technology **Plenary Session**, AIChE Annual Meeting, Salt Lake City, UT, November 2007.
137. K. Chen, N. Nair, M. S. Strano, and R. D. Braatz (speaker). "Parameter Identification for Chirality-selective Single-walled Carbon Nanotube Chemical Reaction Networks," CAST **Plenary Session**, AIChE Annual Meeting, Salt Lake City, November 2007.
138. "Modeling and Design for Drug Delivery, Tissue Engineering, and Crystallization" Bend Research, Bend, OR, November 12, 2007.

139. "Advances in Crystallization Modeling and Control," Bend Research, Bend, OR, November 12, 2007.
140. "Modeling of Controlled Release Microspheres," Regenerative Biology and Tissue Engineering Theme, Institute for Genomic Biology, December 19, 2007, noon.
141. "Advances in PAT for Pharmaceutical Crystallization," Bristol-Myers Squibb Research Center, New Brunswick, NJ, February 19, 2008.
142. "Process Analytical Technology for Pharmaceutical Crystallization," Bristol-Myers Squibb Research Center, New Brunswick, NJ, February 19, 2008.
143. "Modeling and Design of Multiscale Chemical Systems," University of Waterloo, Canada, March 20, 2008.
144. **Plenary Lecture**, "Advances in the Control of Pharmaceutical Crystallization Processes," 19th China Process Control Conference, Beijing, China, July 23-26, 2008.
145. "Modeling and Design of Multiscale Chemical Systems," Tennessee Technological University, Cookeville, TN, September 16, 2008.
146. "Modeling of Pharmaceutical and Biomedical Systems," Tennessee Technological University, Cookeville, TN, September 16, 2008.
147. "Mathematical Modeling and Design of Biomolecular Systems," Department of Bioengineering, University of Illinois at Chicago, January 23, 2009.
148. Richard D. Braatz (speaker) and Paul J. A. Kenis, "Screening, Optimization, and Modeling of Protein and Pharmaceutical Crystallization within High-throughput Microfluidic Platforms," Symposium on Recent Challenges in Crystallisation Science and Engineering, Institute of Process Research and Development, University of Leeds, United Kingdom, March 24, 2009.
149. "Multiscale Simulation and Systems Engineering," Beckman Institute of Advanced Science and Technology, Urbana, Illinois, April 6, 2009.
150. "Robust Optimal Control of Distributed Parameter Systems," Institut für Automatik (Automatic Control Laboratory), Eidgenössische Technische Hochschule (Swiss Federal Institute of Technology), Zürich, Switzerland, April 20, 2009.
151. "Advances in Pharmaceutical and Protein Crystallization," Institut für Verfahrenstechnik (Institute for Process Engineering), Eidgenössische Technische Hochschule (Swiss Federal Institute of Technology), Zürich, Switzerland, April 21, 2009.
152. "Robust Optimal Control of Distributed Parameter Systems," Institut für Systemtheorie und Regelungstechnik (Institute for Systems Theory and Automatic Control), University of Stuttgart, Germany, April 22, 2009.
153. "PAT and Direct Design Approaches to Crystallisation," Glaxo Smith Kline, Stevenage, United Kingdom, April 24, 2009.
154. "Crystallisation Modeling," Glaxo Smith Kline, Stevenage, United Kingdom, April 24, 2009.
155. "Robust Optimal Control of Distributed Parameter Systems," Cymer Center for Control Systems and Dynamics, University of California at San Diego, CA, May 8, 2009.
156. "In-situ Process Video Microscopy, FBRM, and Kinetics Modeling of Emulsions," Procter and Gamble, Cincinnati, Ohio, June 4, 2009.
157. "Process Analytical Technology with Application to Industrial Crystallization," Procter and Gamble, Cincinnati, Ohio, June 4, 2009.

158. V. R. Subramanian (speaker), V. Boovaragavan, V. Ramadesigan, K. Chen, and R. D. Braatz. "Model Reformulation and Design of Lithium-Ion Batteries," Foundations of Computer-Aided Process Design, Breckenridge, CO, June 7-12, 2009.
159. R. D. Braatz (speaker), K. Chen, N. Nair, and M. S. Strano, "Modeling and Design of Carbon Nanotube-based Sensors," Purdue University, West Lafayette, Indiana, July 17, 2009.
160. R. D. Braatz (presenter), L. Goh, K. Kim, D. Reid, M. Rasche, and M. Fujiwara, "Interactive Simulations for Illustrating "Nano" Concepts: Nanoparticles, Nanowires, and Nanoporous Materials," Addressing the Challenges of Nanoscale Science and Engineering Education Symposium on Undergraduate Nano-Education, University at Albany, NY, August 6, 2009 (poster).
161. Contributor to "Nano 101" Session, 8th Annual NanoBusiness Conference, Chicago, Illinois, September 8, 2009. http://nanobusiness2009.com/index.php/program
162. "Computer-Aided Design of Spatially Controlled Release in Stem Cell Tissue Engineering," Topics in Bioengineering Seminar Series, School of Engineering and Applied Sciences, Harvard University, September 22, 2009.
163. "Robust Optimal Control of Finite-time Distributed Parameter Systems," Universite Catholiqué de Louvain, Belgium, October 13, 2009.
164. "Robust Optimal Control of Finite-time Distributed Parameter Systems," Optimization in Engineering Center, Katholieke Universiteit Leuven, Belgium, October 15, 2009.
165. "Robust Optimal Control of Finite-time Distributed Parameter Systems," Institute for Automation Engineering, Otto-von-Guericke-University, Magdeburg, Germany, October 22, 2009.
166. "Advances in Pharmaceutical and Protein Crystallization," Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg, Germany, October 23, 2009.
167. "Advances in Pharmaceutical and Protein Crystallization," Department of Chemical Engineering, University of Loughborough, England, October 26, 2009.
168. "Design and Control of Multiscale Chemical Systems," Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA, November 6, 2009.
169. "Multiscale Simulation in Science and Engineering," COMSEF **Plenary Session**: Opportunities for Chemical Engineering in Petascale Computing, AIChE Annual Meeting, Nashville, TN, November 9, 2009.
170. "The Role of Automatic Process Control in QbD," Emerging Topics **Plenary Session**, Topical I: Comprehensive Quality by Design in Pharmaceutical Development and Manufacture, AIChE Annual Meeting, Nashville, TN, November 11, 2009.
171. "Interactive Computational Engineering and Science Software for Nanoscale Applications," Education **Plenary Session**, International Conference for High Performance Computing, Networking, Storage and Analysis (SC09), Portland OR, November 15, 2009.
172. M. Kishida, D. W. Pack, and R. D. Braatz (speaker), "Computer-based Design for Stem Cell Tissue Engineering," Synthetic Biology: Building on Nature's Inspiration, 7th Annual National Academies Keck Futures Initiative (NAKFI) Conference, The National Academies, Irvine, California, November 19-22, 2009 (poster).
173. "Advances in Pharmaceutical Crystallization," Boehringer-Ingelheim, Connecticut, January 15, 2010.
174. "Design and Control of Multiscale Chemical Systems," Department of Chemical and Biological Engineering, Tufts University, Medford, Massachusetts, February 8, 2010.

175. "Computer-Aided Design of Spatially Controlled Release in Stem Cell Tissue Engineering," Department of Chemical and Biological Engineering, Rensselaer Polytechnic Institute, Troy, New York, April 30, 2010.
176. "Computer-Aided Design of Spatially Controlled Release in Stem Cell Tissue Engineering," Bio-Interest Group Seminar Series, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, August 30, 2010.
177. "Spatially Controlled Release in Stem Cell Tissue Engineering," Percivia, Cambridge, Massachusetts, February 4, 2011.
178. "Advances in Pharmaceutical Crystallization," Sunovion Pharmaceuticals, Marlborough, Massachusetts, February 24, 2011.
179. "Design and Control of Multiscale Chemical Systems," Alchemy 2011: Energise the Future, National Institute of Technology, Tiruchirapalli, India, March 18, 2011 (via skype).
180. "Robust Optimal Control of Finite-time Distributed Parameter Systems," Laboratory for Information and Decision Systems, Massachusetts Institute of Technology, Cambridge, Massachusetts, April 5, 2011.
181. "Estimation and Modeling of Crystal Size and Shape Evolution Using In Situ Tools," Millennium Pharmaceuticals, Cambridge, Massachusetts, May 5, 2011.
182. R. Lakerveld, R. D. Braatz, and P. I. Barton, "A Plant-wide Control Strategy for Continuous Pharmaceutical Manufacturing," Novartis, East Hanover, New Jersey, May 19, 2011 (poster).
183. "Process Systems Engineering and Intensification," Eni-MIT Workshop, Milan, Italy, June 29, 2011.
184. "NanoSystems Engineering: Analysis, Design, and Control at the Nanoscale," Institut für Chemie- und Bioingenieurwissenschaften (Institute for Chemical and Bioengineering), Eidgenössische Technische Hochschule (Swiss Federal Institute of Technology), Zürich, Switzerland, August 26, 2011.
185. "Efficient Polynomial-time Outer Bounds on State Trajectories for Uncertain Polynomial and Rational Systems," Institut für Systemtheorie und Regelungstechnik (Institute for Systems Theory and Automatic Control), University of Stuttgart, Germany, September 27, 2011.
186. **Keynote Speaker**, "Advances in Pharmaceutical Crystallization: Control of Polymorphic Identity, Shape, and Size Distribution," International Congress on Pharmaceutical Engineering Science, Graz, Austria, September 29, 2011.
187. "Fault-Tolerant Model Predictive Control of Refining," BP, Naperville, Illinois, November 16, 2011.
188. "Process Intensification," Eni-MIT Joint Steering Committee Meeting, Cambridge, Massachusetts, November 18, 2011.
189. "Quality by Design Approaches for Pharmaceutical and Biopharmaceutical Manufacturing Processes," Annual Biomanufacturing Summit, Massachusetts Institute of Technology, Cambridge, Massachusetts, November 18, 2011.
190. "Frontiers of Process Monitoring and Control of Industrial Systems," Pall Corporation Executive Briefing, Massachusetts Institute of Technology, Cambridge, Massachusetts, November 21, 2011.
191. "Control of Nano and Microchemical Systems," in Session on "Non-traditional Application Domains: Success Stories and Challenges," Chemical Process Control VIII, Savannah, Georgia, January 11-13, 2012.

192. "Advances in Pharmaceutical Crystallization: Control of Polymorphic Identity, Shape, and Size Distribution," Millennium Pharmaceuticals, Cambridge, Massachusetts, January 20, 2012.

193. "Systems Nanotechnology: Identification, Estimation, and Control at the Nanoscale," Mork Family Department of Chemical Engineering and Materials Science, University of Southern California, Los Angeles, January 26, 2012.

194. "Advanced Control Techniques from Other Fields, Their Applicability, and Impact on Energy Storage," ARPA-E Workshop, Washington, DC, February 8, 2012.

195. "Chemical Engineering from Fish Oil to Systems Nanotechnology," School of Chemical, Biological, and Environmental Engineering, Oregon State University, Corvallis, Oregon, February 24, 2012.

196. "Abstracting Knowledge from Data: Fault Detection, Diagnosis, and Feedback Control," Data Analytics for the Energy Industry Workshop, The Royal Society of Chemistry, London, United Kingdom, March 20, 2012.

197. "Systems and Control of Lithium-ion Batteries," United Technologies Research Corporation, South Windsor, Connecticut, March 27, 2012.

198. **Julia Sung Distinguished Lecture**, "Advances in Pharmaceutical Crystallization: Control of Polymorphic Identity, Shape, and Size Distribution," Department of Chemical and Biological Engineering, University of British Columbia and the Vancouver Chapter of IEEE, Vancouver, British Columbia, Canada, March 29, 2012.

199. R. Lakerveld (speaker), J. M. B. Evans, B. Benyahia, R. D. Braatz, and P. I. Barton, "Implementing Continuous Manufacturing: The Synergy Between Plant-wide Control, Modeling, and QbD," Pharma QbD Forum, Berlin, Germany, April 24-25, 2012.

200. "Systems Nanotechnology: Identification, Estimation, and Control of Nanoscale Systems," Perspectives in Control Theory and Systems Biology - A Fest Colloquium on the Occasion of Frank Allgöwer's 50th birthday, Stuttgart, Germany, June 11, 2012.

201. **Semi-plenary Lecture**, "Systems Nanotechnology: Identification, Estimation, and Control of Nanoscale Systems," American Control Conference, Montréal, Quebec, Canada, June 27, 2012.

202. "Data-driven Methods for Fault Detection and Diagnosis," BP, Naperville, Illinois, July 26, 2012.

203. "Systems Nanotechnology: Moving From Nano-Science to Nano-Products," Future Innovation in Process Systems Engineering, Aldemar-Olympian Village, Western Peloponnese, Greece, August 29-31, 2012.

204. "Systems Nanotechnology: Estimation, Design, and Control of Nanoscale Systems," School for Engineering of Matter, Transport, and Energy, Arizona State University, Tempe, Arizona, September 10, 2012.

205. R. Lakerveld (speaker), B. Benyahia, P. L. Heider, H. Zhang, S. Mascia, J. M. B. Evans, R. D. Braatz, and P. I. Barton, "Case Study: The Application of a Plant-wide Control Strategy for a Continuous Pharmaceutical Process at the Novartis-MIT Center for Continuous Manufacturing," The University of Heidelberg International QbD/PAT Conference 2012, Heidelberg, Germany, September 26-27, 2012.

206. **Plenary Lecture**, "Control of Molecular Purity, Crystal Structure, and Particle Size Distribution in Pharmaceutical Crystallization," IEEE Multi-Conference on Systems and Control (MSC), Dubrovnik, Croatia, October 2-5, 2012.

207. "Systems Nanotechnology: Identification, Estimation, and Control of Nanoscale Systems," Center for Control, Dynamical-Systems, and Computation, University of California, Santa Barbara, October 12, 2012.

208. "Control of Molecular Purity, Crystal Structure, and Particle Size Distribution in Pharmaceutical Crystallization," Department of Chemical and Biomolecular Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea, October 22-23, 2012.

209. **Keynote Lecture**, "Systems Nanotechnology: Estimation, Design, and Control of Nanoscale Systems," Fall Symposium of the Korean Institute of Chemical Engineers, Pushan, South Korea, October 24, 2012.

210. **Plenary Lecture**, R. D. Braatz (speaker), "Looking to the Future in Continuous Pharmaceutical Manufacturing," Plenary Session on the Next Frontier in the Application of Quality by Design, AIChE Annual Meeting, Pittsburgh, Pennsylvania, October 28 – November 2, 2012. Lecture described in AIChE ChEnected news on October 31, 2012. The presentation is available on-line in AIChE ChemE on Demand at http://www.aiche.org/resources/chemeondemand/conference-presentations/looking-future-continuous-pharmaceutical-manufacturing.

211. "Computational Engineering and Science Software for Nanoscale Explorations," SIAM Computational Science and Engineering Conference, Boston, Massachusetts, February 27, 2-4 pm, 2013.

212. R. Lakerveld (speaker), B. Benyahia, P. L. Heider, H. Zhang, S. Mascia, J. M. B. Evans, R. D. Braatz, and Paul I. Barton, "A Plant-wide Control Strategy for an Integrated Continuous Pharmaceutical Pilot Plant," 10th Annual PAT and Quality by Design, London, United Kingdom, March 18-20, 2013.

213. "Design of a Novel Continuous Pharmaceutical Crystallizer," Millennium Pharmaceuticals, Cambridge, Massachusetts, May 17, 2013.

214. "Control in Continuous Pharmaceutical Manufacturing," U.S. Food and Drug Administration, White Oak campus, Silver Spring, Maryland, June 4, 2013.

215. "An Overview on Multiscale Modeling and Simulation I," Summer School of the International Max Planck Research Graduate School, Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg, Germany, September 2, 2013.

216. "An Overview on Multiscale Modeling and Simulation II," Summer School of the International Max Planck Research Graduate School, Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg, Germany, September 2, 2013.

217. "Perspectives on Modeling and Control of Li-ion Batteries," Systems and Control Seminar Series, Department of Electrical Engineering, Otto-von-Guericke University Magdeburg, Germany, September 4, 2013.

218. "Perspectives on Modeling and Control of Li-ion Batteries," Technische Universität Braunschweig, Germany, September 6, 2013.

219. "Design and Control of Multiscale Chemical Systems," ABB Corporate Research Centre, Bangalore, India, September 10, 2013.

220. "Fast Model Predictive Control," ABB Corporate Research Centre, Bangalore, India, September 10, 2013.

221. **Keynote Address**, "Optimization and Control Using Population Balance Models," 5th International Conference on Population Balance (PB) Modelling 2013 (PBM-2013), Bangalore, India, September 11, 2013.

222. "An Introduction to Time Series Analysis," BP, September 16, 2013.
223. "Systems Nanotechnology: Engineering Nanomaterials for Chemical, Pharmaceutical, and Biological Applications," Department of Chemical Engineering, Purdue University, West Lafayette, Indiana, October 29, 2013.
224. "A Roadmap for the Multiscale Simulation of Lithium-ion Batteries," Materials for a Sustainable Energy Future Workshop III: Batteries and Fuel Cells, Institute for Pure & Applied Mathematics, University of California at Los Angeles, November 6, 2013.
225. "Control in Continuous Pharmaceutical Manufacturing," Novartis, Basel, Switzerland, November 11, 2013.
226. "Systems Nanotechnology: Engineering Nanomaterials for Chemical, Pharmaceutical, and Biological Applications," Department of Chemical Engineering, University of Massachusetts, Amherst, November 19, 2013.
227. **Plenary Lecture**, S. Streif, K.-K. K. Kim, P. Rumschinski, M. Kishida, D. E. Shen, R. Findeisen, and R. D. Braatz (speaker), "Robustness Analysis, Prediction and Estimation for Uncertain Biochemical Networks," Computer Applications in Bio Technology and 10th International Symposium on Dynamics and Control of Process Systems, Mumbai, India, December 16-20, 2013.
228. "Process Control in Continuous Manufacturing," PreCon Workshop on Control Strategy for Continuous Manufacturing, 28th International Forum and Exhibition on Process Analytical Technology (Process Analysis & Control), aka IFPAC 2014 Annual Meeting, Arlington, Virginia, January 20, 2014.
229. Richard Lakerveld (speaker), Brahim Benyahia, Patrick L. Heider, Haitao Zhang, Aaron Wolfe, Christopher J. Testa, Sean Ogden, Devin R. Hersey; Sal Mascia, James M. B. Evans, Richard D. Braatz, and Paul I. Barton, "Plant-wide control for integrated continuous pharmaceutical manufacturing," SMi Quality by Design. London, UK, February 25, 2014.
230. "Control of Molecular Purity, Crystal Structure, and Particle Size Distribution in Pharmaceutical Crystallization," Department of Chemical Engineering, University of Rhode Island, Kingston, Rhode Island, February 27, 2014.
231. "Ideas on Integration of OSIsoft into Chemical Engineering Curricula," OSIsoft Users Conference, San Francisco, California, March 27, 2014.
232. "Dynamic Modeling of Pharmaceutical Manufacturing Processes," Boehringer-Ingelheim Pharmaceuticals Inc., Ridgefield, Connecticut, April 30, 2014.
233. "Continuous Slug-Flow Crystallization," Millennium Pharmaceuticals, Cambridge, Massachusetts, May 23, 2014.
234. "Systems Technology in Biologics QbD Implementation," Workshop on PAT and QbD in Biopharmaceutical Industry, Biopharmaceutical Process and Quality Consortium 3rd Biopharmaceutical Summit, University of Massachusetts, Lowell, May 30, 2014.
235. "Control of Molecular Purity, Crystal Structure, and Particle Size Distribution in Pharmaceutical Crystallization," Beijing University of Chemical Technology, China, June 30, 2014.
236. "Control of Molecular Purity, Crystal Structure, and Particle Size Distribution in Pharmaceutical Crystallization," Tianjin University, China, July 1, 2014.
237. **Plenary Speaker**, "Robust Optimal Control of Finite-time Distributed Parameter Systems," International Conference on Mechatronics and Control, Jinzhou, China, July 5, 2014. http://icmc.bhu.edu.cn/pageples.asp

238. "Robust Optimal Control of Finite-time Distributed Parameter Systems," Harbin Institute of Technology, China, July 8, 2014.
239. **Plenary Lecture**, "Advances in the Design and Control of Continuous Pharmaceutical Crystallizers," British Association for Crystal Growth Annual Conference, University of Leeds, United Kingdom, July 15, 2014, 8:50 am. Will be paid 1000 pounds for travel.
240. "Robust Optimal Control of Finite-time Nonlinear Distributed Parameter Systems," Workshop on Uncertain Dynamical Systems, Amsterdam, The Netherlands, August 20-22, 2014.
241. "Controlling Pharmaceutical Quality," **Plenary Session**, FDA/PQRI Conference on Evolving Product Quality, Bethesda, Maryland, September 16, 2014.
242. "Mathematical Modeling, Design, and Control of Continuous Viral Vaccine Manufacturing," Sanofi-Pasteur, Toronto, Canada, September 18, 2014.
243. "Advances in the Design and Control of Continuous Pharmaceutical Crystallizers," Clemson University, South Carolina, September 25, 2014.
244. "Multiscale Simulation of Chemically Reacting Systems," **Schiesser Lecture in Scientific Computing**, Lehigh University, Bethlehem, Pennsylvania, October 15, 2014.
245. "Systems Nanotechnology: Identification, Estimation, and Control of Nanoscale Systems," Department of Electrical Engineering, Universidad de Concepción, Chile, November 3, 2014.
246. "Systems Nanotechnology: Identification, Estimation, and Control of Nanoscale Systems," Pontificia Universidad Católica de Valparaíso, Chile, November 4, 2014.
247. **Distinguished Lecture**, "Systems Nanotechnology: Identification, Estimation, and Control of Nanoscale," XXI Congress of ACCA (Asociación Chilena de Control Automático), Faculty of Engineering, Universidad Central de Santiago de Chile, Santiago, Chile, November 7, 2014.
248. "A First-Principles Model-based Approach to Real-time Release," Real Time Parametric Release BioMAN Annual Summit, Cambridge, November 14, 2014.
249. **CAST Lecture**, "From Molecules to Manufacturing Plants: A Journey Across Time and Length Scales," AIChE Annual Meeting, Atlanta, Georgia, November 18, 2014.
250. "Advanced Control of Manufacturing Processes," Brewer Science, East Hanover, Missouri, December 12, 2014.
251. "Theoretical Analysis of Temperature-Induced Nucleation in Dual Impinging Jet Mixers," SY-BIO Workshop, University of Texas at Dallas, March 25-26, 2015.
252. **Keynote Lecture**, "Advances in Biopharmaceutical Manufacturing," 15th IFAC/IEEE/IFIP/IFORS Symposium on Information Control Problems in Manufacturing, Ottawa, Canada, May 11, 2015.
253. "Process Intensification in Reaction Engineering and Crystallization," 25/50/75 Celebration for Professor H. Scott Fogler, University of Michigan, Ann Arbor, May 16, 2015.
254. Zhilong Zhu, You Peng, T. Alan Hatton (speaker), Kamal Samrane, Allan S. Myerson, and Richard D. Braatz, "Crystallization of Calcium Sulphate during Phosphoric Acid Production: Modeling Particle Shape and Size Distribution," International Symposium on Innovation and Technology in the Phosphate Industry, Marrakesh, Morocco, May 18-20, 2015.
255. "Continuous Pharmaceutical Manufacturing: Quality-by-Design, Systems Integration, and Control," Modernization in Manufacturing session, ISPE/FDA/PQRI Quality Manufacturing Conference, Washington, DC, June 1, 2015.

256. "Quality by Design and Data Analytics for Biopharmaceutical Manufacturing," GlaxoSmithKline, Philadelphia, PA, July 29, 2015.
257. **Plenary Lecture**, "Perspectives on Process Monitoring of Industrial Systems," SAFEPROCESS, Paris, France, September 2-4, 2015.
258. "Optimal Control via Linear and Bilinear Matrix Inequalities," University of Pavia, Italy, September 14-16, 2015.
259. "Dynamic Optimization and Control of Uncertain Systems," BP, September 15, 2015.
260. **Semi-Plenary Lecture**, "Nonlinear Model Predictive Control of Systems with Probabilistic Time-invariant Uncertainties," 5th IFAC Conference on Nonlinear Model Predictive Control, Seville, Spain, September 17, 2015.
261. "Robust Nonlinear Model Predictive Control for Industrial Systems," Industrial Session, 5th IFAC Conference on Nonlinear Model Predictive Control, Seville, Spain, September 19, 2015.
262. "Recent Advances in Continuous Slug-flow Crystallization," Association for Crystallization Technology Workshop, Philadelphia, Pennsylvania, October 6, 2015.
263. "Prediction and Real-time Control of Product Quality Attributes," BioProcess International Conference & Exhibition, Cambridge, Massachusetts, October 26-29, 2015.
264. "Systems Nanotechnology: Identification, Estimation, and Control of Nanoscale Systems," Control, Instrumentation and Robotics Seminar Series, Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, November 2, 2015.
265. "Recent Advances in Continuous Slug-flow Crystallization," Crystallization and Evaporation **Plenary Session**, AIChE Annual Meeting, Salt Lake City, November 9, 2015.

F. Offices Held in Professional Societies
- Chapter Advisor, Zeta Chapter, Alpha Chi Sigma, 2000-2002
- Chair, Technical Committee on Industrial Process Control, IEEE Control Systems Society, 2002-2010
- Program Coordinator, Systems and Process Control (Area 10b), American Institute of Chemical Engineers, 2005
- Director, CAST Executive Committee, American Institute of Chemical Engineers, 2005-2007
- Chair, WebCAST Committee, American Institute of Chemical Engineers, 2006-2007
- Director, American Automatic Control Council, 2006-2007
- Chair, Awards Subcommittee for IEEE Transactions in Control Systems Technology Outstanding Paper Award, 2009-2011
- Board of Governors, IEEE Control Systems Society, 2010
- Second Vice Chair, CAST division, American Institute of Chemical Engineers, 2010
- Chair, Awards Committee, CAST division, American Institute of Chemical Engineers, 2010
- First Vice Chair, CAST division, American Institute of Chemical Engineers, 2011
- Chair, CAST division, American Institute of Chemical Engineers, 2012
- Past Chair, CAST division, American Institute of Chemical Engineers, 2013
- Vice President, American Automatic Control Council, 2016-date

G. Editorships and Advisory Boards of Journals, Other Learned Publications, or Programs
Institute of Electrical and Electronic Engineers
- IEEE Control Systems Society Conference Editorial Board, 1997-2000

- Associate Editor, IEEE Conference on Decision and Control, 1997-2000
- Associate Editor, American Control Conference, 1998-2000
- Associate Editor, Joint IEEE Conference on Decision and Control and the European Control Conference, 2005
- Associate Editor, IEEE Transactions on Automatic Control, 2008-2010
- Associate Editor, IEEE Control Systems Magazine, 2010
- Deputy Editor, IEEE Control Systems Magazine, 2010-2011
- Editor-in-Chief, IEEE Control Systems Magazine, 2012-2014
- Senior Editor, IEEE Life Sciences Letters, 2014-date

International Federation of Automatic Control
- Associate Editor, Journal of Process Control, 2000-2013
- Associate Editor, Automatica, 2002-date
- Editor, Special Issue on Advanced Control of Chemical Processes, Journal of Process Control, 2010-2014
- Editorial Board, Annual Reviews in Control, 2015-date

International Journal of Robust and Nonlinear Control
- Editor, Special Issue on Chemical Process Control, 2007

Optimal Control Applications and Methods
- Editor at Large, 2007-date

Computers and Chemical Engineering
- Editorial Advisory Board, 2010-date
- Editor, Special Issue in Honor of Manfred Morari, 2011-2014

American Automatic Control Council
- AIChE Society Review Chair, 2005
- Editor, Invited Papers, 2007

American Chemical Society
- Advisory Board, Industrial Engineering and Chemistry Research, 2005-2007

The Control Handbook, Second Edition, CRC Press
- Editorial Board, 2008-2011

University of California at Santa Barbara
- Advisory Board, Computational Science and Engineering IGERT Program, 2006

University of Illinois at Urbana-Champaign
- Advisory Board, Informatics and Computation Ubiquitous throughout Baccalaureate Education Program, 2007-2010

University of Illinois at Chicago, Purdue University, and Colorado School of Mines
- Advisory Board, Integrating Cognition and Measurement with Conceptual Knowledge - Establishing the Validity and Diagnostic Capacity of Concept Inventories, NSF Award #DRL-0918552, 2010-2012

CACHE Corporation
- Academic Trustee, 2013-date
- Lead, statistics activities, 2013-date
- Member, Awards Committee, 2014-date

Advanced Manufacturing National Program Office, White House-chartered Interagency Team (hosted by NIST)
- Advanced Manufacturing Partnership 2.0 (AMP 2.0) Technology Work Team, 2014

Birkhäuser

- Editorial Board, Control Engineering series, 2014-date

H. Review Panels
- UIUC/Hertz Fellowship Review Panel, 1994-2002, 2004-2010
- Ted Peterson Student Paper Award Panel, CAST Division, American Institute of Chemical Engineers, 1996
- Pulp and Paper Technical Association of Canada (PAPTAC) Review Panel, 1996-2002
- Computational Science and Engineering Proposal Review Panel, UIUC, 1997-1998, 2001-2002, 2008-2009
- Shen Postdoctoral Fellowship Award Panel, UIUC, 1999
- Alpha Chi Sigma (AXΣ) Outstanding Student Award Panel, Zeta Chapter, 1999
- National Science Foundation Phase I Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program Peer Review Panel, 1999, 2001, 2002, 2005, 2007
- CAST Directors' Award Panel, American Institute of Chemical Engineers, 2002, 2004, 2006, 2007
- Control Engineering Practice Award Panel, American Automatic Control Council, 2003
- Best Student Paper Award Panel, American Automatic Control Council, 2003-2005
- Best Student Paper Award Panel, IEEE Conference on Decision and Control, 2003-2005
- Hugo O'Schuck Award Panel, American Automatic Control Council, 2004
- Chair, CAST Directors' Award Panel, American Institute of Chemical Engineers, 2004
- CAST Division Awards Committee, American Institute of Chemical Engineers, 2005-2007
- Advanced Placement Chemistry Virtual Laboratories Review Panel, The College Board, 2006-2009
- IEEE Control Systems Field Award Committee, 2007-2010
- Multiscale Mathematics and Optimization for Complex Systems Review Panel, Department of Energy, 2008
- External Evaluator, Department of Chemical Engineering, Queen's University, Ontario, Canada, 2008-2009
- Journal of Process Control Best Paper Prize Selection Committee, International Federation of Automatic Control, 2009-2011, 2012-2014
- National Science Foundation Process and Reaction Engineering Program Peer Review Panel, Chemical, Bioengineering, Environmental and Transport Systems (CBET) Division, 2009
- IEEE Control Systems Society Fellow Selection Committee, 2009-2010
- IEEE Control Systems Society Award Committee, 2009-2011
- Chair, Awards Subcommittee on TCST Outstanding Paper Award, 2009-2011
- Technology Review Panel, Catalan Institution for Research and Advanced Studies (ICREA), 2009-2010
- Awards Committee, CAST division, American Institute of Chemical Engineers, 2005-2014, 2015-date
- Award Subcommittee, R.H. Wilhelm Award in Chemical Reaction Engineering, American Institute of Chemical Engineers, 2010
- Beckman Institute for Advanced Science and Technology Seed Proposal Panel, UIUC, 2010
- Panel Leader, Centre Proposal Review Panel, Research Council of Norway, 2011
- Natural Sciences and Engineering Research Council of Canada, 2014
- IFAC Applications Paper Prize Selection Committee, 2014

I. Industrial Consulting, Collaborations, and/or Support

- Avery-Dennison – designed and implemented the first profile controller on an adhesive coating machine (1990-1991)
- DuPont – designed algorithms for sensor fusion and process control (1993-1994, 1995)
- International Paper Company – supervised the design and implementation (w/students) of fault detection and diagnosis systems for two large-scale industrial facilities worth $600 million (1996-2001)
- International Sematech – constructed simulation models and designed optimal control for rapid thermal annealing during ultrashallow junction formation in microelectronic devices (1998-2000, with students and Dr. E.G. Seebauer)
- Procter and Gamble – supervised the design of algorithms and software implementation (w/students) for the modeling and optimal control of chemical processes (2000-2003); consulting and research support on emulsion crystallization (2009-date)
- Abbott Laboratories – consulted on in-situ sensor technologies for pharmaceutical crystallizers and chemical reactors (2002, 2006-2007); research support for crystallization modeling and novel crystallizer designs (2009-date)
- Dow – consulted on a fault diagnosis algorithm for large-scale chemical plants (2002)
- Merck – consulted and supervised the design and implementation (w/students) of modeling, sensor, and control algorithms on pharmaceutical crystallizers (1997-2005)
- United Technologies Corporation – consulted with UTC Power (then UTC Fuel Cells) on the design and implementation of fault diagnosis systems for fuel cell power plants (2002-2003); research support by UTC Power and Sikorsky Aircraft Corporation for developing procedures for the optimal design of maintenance schedules (2004-2009)
- IBM – constructed simulation models for the copper electrodeposition process for making interconnects for microelectronic devices (2002-2008, with students and Dr. R.C. Alkire who was project lead)
- Sepracor/Sunovion Pharmaceuticals – consulted on the modeling and design of batch pharmaceutical crystallizers (2003, 2006, 2011)
- Round Table Group – member of this consortium of consulting professors in the chemistry, pharmaceutical, and chemical engineering areas (2003-2009)
- Bristol-Myers Squibb – consulted on the modeling and design of batch pharmaceutical crystallizers (2004, 2008-date)
- U.S. Food and Drug Administration – consult on process analytical technologies for pharmaceutical crystallization processes (2004-2005, 2012-date)
- Pfizer – consulted or collaborated on crystallizer design and control (2006-2007, 2010-2011)
- Eli Lilly – supports research projects in pharmaceutical crystallization (2007-2010)
- Bend Research – supports research projects in pharmaceutical crystallization (2008-2009)
- OSIsoft – supports research projects in process control (2008-date)
- GlaxoSmithKline – consulted on pharmaceutical process analytical technology (2009)
- Novartis – supports control of continuous pharmaceutical manufacturing facilities (2010-date)
- BP – supports development of methods for the design of fault-tolerant model predictive control systems (2011-date)
- Aegerion Pharmaceuticals – consulting on pharmaceutical crystallization (2011-2014)
- Biogen Idec – consulting on process technologies (2012-date)

- Industrial Machine Automation (IMA) – consulted on continuous pharmaceutical manufacturing (2013)
- Greene, Tweed & Co. – consulted on crystallization technology (2013-2014)
- Brewer Science – consulting on advanced manufacturing (2014)

II. PUBLICATIONS

A. Doctoral Thesis

- *Robust Loopshaping for Process Control*, California Institute of Technology, Pasadena, California, 1993.

B. Books/Compilations

1. E. L. Russell, L. H. Chiang, and R. D. Braatz. *Data-driven Methods for Fault Detection and Diagnosis in Chemical Processes*, Springer-Verlag, London, 2000. **220+ citations**.
2. A. P. Featherstone, J. G. VanAntwerp, and R. D. Braatz. *Identification and Control of Sheet and Film Processes*, Springer-Verlag, London, 2000. reviewed by B. Wayne Bequette, *IEEE Control Systems*, 22(3), 102-103, 2002, and Peter Wellstead, *International Journal of Robust and Nonlinear Control*, 13, 1177-1180, 2003.

   "Essential reading for researchers and engineers in the area" – Peter Wellstead, page 1178, above review.

3. L. H. Chiang, E. L. Russell, and R. D. Braatz. *Fault Detection and Diagnosis in Industrial Systems*, Springer-Verlag, London, 2001. Chinese translation available from China Machine Press, Beijing, China. Has been used in courses at universities in the United States, United Kingdom, Denmark, China, Sweden, and Finland. reviewed by Thomas McAvoy, *Journal of Process Control*, 12, 453-454, 2002, and Joe Au, *Measurement Science and Technology*, 12, 1745, 2001.) **1200+ citations**.

"Excellent overview" – Thomas McAvoy, page 453, above review.
"Provides a much needed state-of-the-art exposition on fault detection and diagnosis" – Joe Au, above review.

4. R. D. Braatz, A. N. Ford Versypt, and L. M. Goh. *Nanoscale Drug Delivery Module: Teacher's Edition*, Materials World Modules, Northwestern University, Evanston, Illinois, 2012. Available for purchase at http://www.materialsworldmodules.org/modules/drugDelivery.shtml

5. R. D. Braatz, A. N. Ford Versypt, and L. M. Goh. *Nanoscale Drug Delivery Module*, Materials World Modules, Northwestern University, Evanston, Illinois, 2012. Available for purchase at http://www.materialsworldmodules.org/modules/drugDelivery.shtml

C. Book Chapters

1. R. D. Braatz. Internal model control. In *The Control Handbook*, W. S. Levine, editor, CRC Press, Boca Raton, Florida, pp. 215-224, 1996 (invited).
2. R. D. Braatz. Internal model control. In *Control Systems Fundamentals*, W. S. Levine, editor, CRC Press, Boca Raton, Florida, pp. 215-224, 2000 (invited reprint).
3. R. D. Braatz (contributor). Materials and processing. In *Control in an Information Rich World: Report of the Panel on Future Directions in Control, Dynamics, and Systems*, R. M. Murray, editor, SIAM Press, Philadelphia, Pennsylvania, pp. 63-70, 2003 (invited).
4. Z. K. Nagy and R. D. Braatz. Recent advances in the optimal control of batch processes. In *Recent Research Developments in Chemical Engineering*, Volume 5, Transworld Research Network, pp. 99-127, 2003 (invited).
5. R. D. Braatz, M. Fujiwara, T. Wubben, and E. Rusli. Crystallization: Particle size control. In *Encyclopedia of Pharmaceutical Technology*, James Swarbrick, editor, 3rd edition, Marcel Dekker, New York, pp. 858-871, 2006 (invited).
6. E. J. Hukkanen, J. G. VanAntwerp, and R. D. Braatz. Identification and control of polymerization reactors. In *Identification and Control: The Gap between Theory and Practice*, Ricardo S. Sánchez-Peña, Joseba Quevedo Casín, and Vicenç Puig Cayuela, editors, Springer Verlag, London, Chapter 1, pp. 3-41, 2007 (invited).
7. R. D. Braatz, R. C. Alkire, and E. G. Seebauer. Multiscale modeling and design of electrochemical systems. In *Electrochemical Surface Modification – Thin Films, Functionalization and Characterization*, *Advances in Electrochemical Science and Engineering*, R. C. Alkire, D. M. Kolb, J. Lipkowski, and P. N. Ross, editors, Wiley-VCH, Weinheim, Germany, Volume 10, Chapter 4, pp. 289-334, 2008 (invited).
8. R. D. Braatz and M. Hovd. Process control and automation. In *Enciclopedia degli Idrocarburi* (*Encyclopaedia of Hydrocarbons*), Istituto Della Enciclopedia Italiana Fondata da Giovanni Treccani, Rome, Italy, Volume V: Instruments, Chapter 6.5, pp. 389-411, 2009 (invited).
9. M. Kishida and R. D. Braatz. Internal model control. In *The Control Handbook*, 2nd edition, *Control System Fundamentals*, W. S. Levine, editor, CRC Press, Boca Raton, Florida, Chapter 9.7, 2011 (invited).
10. Z. K. Nagy and R. D. Braatz. Nonlinear model predictive control for batch processes. In *The Control Handbook*, 2nd edition, *Control System Applications*, W. S. Levine, editor, CRC Press, Boca Raton, Florida, Chapter 15, 2011 (invited).
11. I. Craig, C. Alrich, R. Braatz, et al. Control in the Process Industries. In *The Impact of Control Technology*, T. Samad and A. Annaswamy, editors, IEEE Control Systems Society, 2011. Available for download at http://ieeecss.org/main/IoCT-report.
12. R. D. Braatz, M. Fujiwara, Z. K. Nagy, T. Wubben, and E. Rusli. Crystallization: Particle size control. In *Encyclopedia of Pharmaceutical Science and Technology*, James Swarbrick, editor, 4th edition, Taylor and Francis, New York, pp. 785-798, 2013 (invited).
13. R. D. Braatz. Advanced control of pharmaceutical crystallization. In *The Impact of Control Technology*, Second Edition, T. Samad and A. Annaswamy, editors, IEEE Control Systems Society, 2014. Available for download at http://ieeecss.org/general/impact-control-technology-2nd-edition.
14. R. Lakerveld, P. L. Heider, K. D. Jensen, R. D. Braatz, K. F. Jensen, A. S. Myerson, and B. L. Trout. End-to-end continuous manufacturing: Integration of unit operations. In *Continuous Manufacturing of Pharmaceuticals*, P. Kleinebudde, J. Rantanen, and J. Khinnast, editors, Wiley (invited). in press.

D. Journal Papers

1. R. D. Braatz and M. Morari. Robust control for a noncollocated spring-mass system. *J. of Guidance, Control and Dynamics*, 15:1103-1110, 1992.
2. R. D. Braatz, M. L. Tyler, M. Morari, F. R. Pranckh, and L. Sartor. Identification and cross-directional control of coating processes. *AIChE J.*, 38:1329-1339, 1992. Reprinted in Part C of the PSE Virtual Issue of AIChE Journal, as one of the most cited papers in the journal on *Process Identification, State Estimation and Control*.
3. D. Laughlin, M. Morari, and R. D. Braatz. Robust performance of cross-directional basis-weight control in paper machines. *Automatica*, 29:1395-1410, 1993.
4. R. D. Braatz and M. Morari. Minimizing the Euclidean condition number. *SIAM J. on Control and Optim.*, 32:1763-1768, 1994.
5. R. D. Braatz, P. M. Young, J. C. Doyle, and M. Morari. Computational complexity of μ calculation. *IEEE Trans. on Auto. Control*, 39:1000-1002, 1994. **330+ citations**.
6. J. H. Lee, R. D. Braatz, M. Morari, and A. Packard. Screening tools for robust control structure selection. *Automatica*, 31:229-235, 1995.
7. R. D. Braatz, J. H. Lee, and M. Morari. Screening plant designs and control structures for uncertain systems. *Comput. Chem. Eng.*, 20:463-468, 1996.
8. R. D. Braatz, M. Morari, and S. Skogestad. Loopshaping for robust performance. *Int. J. of Robust and Nonlinear Control*, 6:805-823, 1996.
9. M. Hovd, R. D. Braatz, and S. Skogestad. SVD controllers for H2, H-infinity, and mu-optimal control. *Automatica*, 33:433-439, 1997.
10. I. G. Horn, J. R. Arulandu, C. J. Gombas, J. G. VanAntwerp, and R. D. Braatz. Improved filter design in internal model control. *Ind. Eng. Chem. Res.*, 35:3437-3441, 1996. **100+ citations**
11. R. D. Braatz and M. Morari. On the stability of systems with mixed time-varying parameters. *Int. J. of Robust and Nonlinear Control*, 7:105-112, 1997.
12. E. L. Russell, C. P. H. Power, and R. D. Braatz. Multidimensional realization of large scale uncertain systems for multivariable stability margin computation. *Int. J. of Robust and Nonlinear Control*, 7:113-125, 1997.
13. E. Rios-Patron and R. D. Braatz. On the identification and control of dynamical systems using neural networks. *IEEE Trans. on Neural Networks*, 8:452, 1997.
14. R. D. Braatz and J. G. VanAntwerp. Advanced cross-directional control. *Pulp & Paper Canada*, 98(7):T237-239, July 1997.
15. A. P. Featherstone and R. D. Braatz. Control-oriented modeling of sheet and film processes. *AIChE J.*, 43:1989-2001, 1997.
16. A. P. Featherstone and R. D. Braatz. Integrated robust identification and control of large scale processes. *Ind. Eng. Chem. Res.*, 37:97-106, 1998.
17. C. L. Mangun, M. A. Daley, R. D. Braatz, and J. Economy. Effect of pore size on adsorption of hydrocarbons in phenolic-based activated carbon fibers. *Carbon*, 36:123-131, 1998.
18. A. P. Featherstone and R. D. Braatz. Input design for large scale sheet and film processes. *Ind. Eng. Chem. Res.*, 37:449-454, 1998.
19. E. L. Russell and R. D. Braatz. Model reduction for the robustness margin computation of large scale uncertain systems. *Comput. Chem. Eng.*, 22:913-926, 1998.

20. S. H. Chung and R. D. Braatz. Teaching antiwindup, bumpless transfer, and split-range control. *Chem. Eng. Edu.*, 32:220-223, 1998.
21. R. D. Braatz and O. D. Crisalle. Robustness analysis for systems with ellipsoidal uncertainty. *Int. J. of Robust and Nonlinear Control*, 8:1113-1117, 1998.
22. R. D. Braatz and M. R. Johnson. Process control laboratory education using a graphical operator interface. *Comp. Appl. Eng. Edu.*, 6:151-155, 1998.
23. J. G. VanAntwerp, R. D. Braatz, and N. V. Sahinidis. Globally optimal robust process control. *J. of Process Control*, 9:375-383, 1999.
24. S. H. Chung, D. L. Ma, and R. D. Braatz. Optimal seeding in batch crystallization. *Can. J. of Chem. Eng.*, 77:590-596, 1999. **120+ citations**
25. A. P. Featherstone and R. D. Braatz. Modal-based cross-directional control. *Tappi J.*, 82:203-207, 1999.
26. D. L. Ma, S. H. Chung, and R. D. Braatz. Worst-case performance analysis of optimal batch control trajectories. *AIChE J.*, 45:1469-1476, 1999.
27. C. L. Mangun, R. D. Braatz, J. Economy, and A. J. Hall. Fixed bed adsorption of acetone and ammonia onto oxidized activated carbon fibers. *Ind. Eng. Chem. Res.*, 38:3499-3504, 1999.
28. R. D. Braatz and E. L. Russell. Robustness margin computation for large scale systems. *Comput. Chem. Eng.*, 23:1021-1030, 1999.
29. S. H. Chung, D. L. Ma, and R. D. Braatz. Optimal model-based experimental design in batch crystallization. *Chemom. Int. Lab. Syst.*, 50:83-90, 2000.
30. J. G. VanAntwerp and R. D. Braatz. Fast model predictive control of sheet and film processes. *IEEE Trans. on Control Syst. Tech.*, 8:408-417, 2000.
31. J. G. VanAntwerp and R. D. Braatz. A tutorial on linear and bilinear matrix inequalities. *J. of Process Control*, 10:363-385, 2000. **300+ citations**
32. J. G. VanAntwerp and R. D. Braatz. Model predictive control of large scale processes. *J. of Process Control*, 10:1-8, 2000.
33. L. H. Chiang, E. L. Russell, and R. D. Braatz. Fault diagnosis in chemical processes using Fisher discriminant analysis, discriminant partial least squares, and principal component analysis. *Chemom. Int. Lab. Syst.*, 50:243-252, 2000. **290+ citations**.
34. E. L. Russell, L. H. Chiang, and R. D. Braatz. Fault detection in industrial processes using canonical variate analysis and dynamic principal component analysis. *Chemom. Int. Lab. Syst.*, 51:81-93, 2000. **180+ citations**.
35. T. Togkalidou, R. D. Braatz, B. K. Johnson, O. Davidson, and A. Andrews. Experimental design and inferential modeling in pharmaceutical crystallization. *AIChE J.*, 47:160-168, 2001.
36. J. G. VanAntwerp, A. P. Featherstone, and R. D. Braatz. Robust cross-directional control of large scale sheet and film processes. *J. of Process Control*, 11:149-178, 2001.
37. R. Gunawan, E. L. Russell, and R. D. Braatz. Comparison of theoretical and computational characteristics of dimensionality reduction methods for large scale uncertain systems. *J. of Process Control*, 11:543-552, 2001.
38. D. L. Ma and R. D. Braatz. Worst-case analysis of finite-time control policies. *IEEE Trans. on Control Syst. Tech.*, 9:766-774, 2001.
39. T. Togkalidou, M. Fujiwara, S. Patel, and R. D. Braatz. Solute concentration prediction using chemometrics and ATR-FTIR spectroscopy. *J. of Crystal Growth*, 231:534-543, 2001. **130+ citations**.

40. E. L. Russell and R. D. Braatz. The average-case identifiability and controllability of large scale systems. *J. of Process Control*, 12:823-829, 2002.
41. R. D. Braatz, M. Fujiwara, D. L. Ma, T. Togkalidou, and D. K. Tafti. Simulation and new sensor technologies for industrial crystallization: A review. *Special Issue on Crystallization and Interfacial Processes*, *Int. J. of Modern Physics B*, 16:346-353, 2002 (invited).
42. R. Gunawan, D. L. Ma, M. Fujiwara, and R. D. Braatz. Identification of kinetic parameters in a multidimensional crystallization process. *Special Issue on Crystallization and Interfacial Processes*, *Int. J. of Modern Physics B*, 16:367-374, 2002.
43. D. L. Ma, D. Tafti, and R. D. Braatz. Compartmental modeling of multidimensional crystallization. *Special Issue on Crystallization and Interfacial Processes*, *Int. J. of Modern Physics B*, 16:383-390, 2002.
44. D. L. Ma, D. K. Tafti, and R. D. Braatz. High resolution simulation of multidimensional crystal growth. *Special Issue in Honor of William R. Schowalter*, *Ind. Eng. Chem. Res.*, 41:6217-6223, 2002 (invited). **110+ citations**
45. D. L. Ma, D. K. Tafti, and R. D. Braatz. Optimal control and simulation of multidimensional crystallization processes. *Special Issue on Distributed Parameter Systems*, *Comput. Chem. Eng.*, 26:1103-1116, 2002 (invited). **110+ citations**
46. S. Ang and R. D. Braatz. Experimental projects for the process control laboratory. *Chem. Eng. Edu.*, 36:182-187, 2002. Invited reprint in *CACHE News*, Volume 55, Fall, 2002.
47. T. Togkalidou, H.-H. Tung, Y. Sun, A. Andrews, and R. D. Braatz. Solution concentration prediction for pharmaceutical crystallization processes using robust chemometrics and ATR FTIR spectroscopy. *Org. Process Res. Dev.*, 6:317-322, 2002.
48. M. Fujiwara, P. S. Chow, D. L. Ma, and R. D. Braatz. Paracetamol crystallization using laser backscattering and ATR-FTIR spectroscopy: Metastability, agglomeration, and control. *Crystal Growth & Design*, 2:363-370, 2002. **180+ citations**.
49. D. L. Ma, J. G. VanAntwerp, M. Hovd, and R. D. Braatz. Quantifying the potential benefits of constrained control for a large scale system. *Special Section on Cross Directional Control*, *IEE Proceedings - Control Theory and Applications*, 149:423-432, 2002.
50. R. D. Braatz. Advanced control of crystallization processes. *Annual Reviews in Control*, 26:87-99, 2002 (invited). **170+ citations**.
51. M. Fujiwara, J. C. Pirkle, Jr., T. Togkalidou, D. L. Ma, R. Gunawan, and R. D. Braatz. A holistic approach to materials process design. *J. of Materials Edu.*, 24:65-70, 2002 (invited).
52. L. H. Chiang and R. D. Braatz. Process monitoring using causal map and multivariate statistics: Fault detection and identification. *Chemom. Int. Lab. Syst.*, 65:159-178, 2003.
53. J. C. Pirkle, Jr. and R. D. Braatz. Dynamic modeling of blown film extrusion. *Polymer Engineering & Science*, 43:398-418, 2003.
54. M. Hovd, D. L. Ma, and R. D. Braatz. On the computation of disturbance rejection measures. *Ind. Eng. Chem. Res.*, 42:2183-2188, 2003. Reprinted in *Modeling, Identification, and Control*, 25:45-56, 2004.
55. D. L. Ma and R. D. Braatz. Robust identification and control of batch processes. *Special Issue on 2nd Pan American Workshop in Process Systems Engineering*, *Comput. Chem. Eng.*, 27:1175-1184, 2003 (invited).
56. Z. K. Nagy and R. D. Braatz. Robust nonlinear model predictive control of batch processes. *AIChE J.*, 49:1776-1786, 2003. Reprinted in Part C of the PSE Virtual Issue of AIChE

Journal, as one of the most cited papers in the journal on *Process Identification, State Estimation and Control*. **160+ citations**

57. R. Gunawan, M. Y. L. Jung, E. G. Seebauer, and R. D. Braatz. Maximum a posteriori estimation of transient enhanced diffusion energetics. *AIChE J.*, 49:2114-2123, 2003.

58. Z. K. Nagy and R. D. Braatz. Worst-case and distributional robustness analysis of finite-time control trajectories for nonlinear distributed parameter systems. *IEEE Trans. on Control Syst. Tech.*, 11:494-504, 2003.

59. T. O. Drews, R. D. Braatz, and R. C. Alkire. Parameter sensitivity analysis of Monte Carlo simulations of copper electrodeposition with multiple additives. *J. Electrochem. Soc.*, 150:C807-C812, 2003.

60. R. Gunawan, M. Y. L. Jung, R. D. Braatz, and E. G. Seebauer. Parameter sensitivity analysis applied to modeling transient enhanced diffusion and activation of boron in silicon. *J. Electrochem. Soc.*, 150:G758-G765, 2003.

61. M. Y. L. Jung, R. Gunawan, R. D. Braatz, and E. G. Seebauer. Ramp-rate effects in transient enhanced diffusion and dopant activation. *J. Electrochem. Soc.*, 150:G838-G842, 2003.

62. E. J. Hukkanen and R. D. Braatz. Measurement of particle size distribution in suspension polymerization using in situ laser backscattering. *Sensors & Actuators B*, 96:451-459, 2003. **100+ citations**

63. T. J. McAvoy and R. D. Braatz. Controllability limitations for processes with large singular values. *Ind. Eng. Chem. Res.*, 42:6155-6165, 2003.

64. K. Dev, M. Y. L. Jung, R. Gunawan, R. D. Braatz, and E. G. Seebauer. Mechanism for coupling between properties of interfaces and bulk semiconductors. *Phys. Rev. B*, 68:195311, 2003.

65. M. Kamrunnahar, R. D. Braatz, and R. C. Alkire. Parameter sensitivity analysis of pit initiation at single sulfide inclusions in stainless steel. *J. Electrochem. Soc.*, 151:B90-B97, 2004.

66. M. Y. L. Jung, R. Gunawan, R. D. Braatz, and E. G. Seebauer. A simplified picture for transient enhanced diffusion of boron in silicon. *J. Electrochem. Soc.*, 151:G1-G7, 2004.

67. Z. K. Nagy and R. D. Braatz. Open-loop and closed-loop robust optimal control of batch processes using distributional and worst-case analysis. *J. of Process Control*, 14:411-422, 2004. **110+ citations**

68. R. Gunawan, M. Y. L. Jung, E. G. Seebauer, and R. D. Braatz. Optimal control of rapid thermal annealing in a semiconductor process. *J. of Process Control*, 14:423-430, 2004.

69. M. Hovd and R. D. Braatz. Handling state and output constraints in MPC using time-dependent weights. *Modeling, Identification, and Control*, 25:67-84, 2004.

70. M. Y. L. Jung, R. Gunawan, R. D. Braatz, and E. G. Seebauer. Effect of near-surface band bending on dopant profiles in ion-implanted silicon. *J. Appl. Phys.*, 95:1134-1139, 2004.

71. T. O. Drews, E. G. Webb, D. L. Ma, J. Alameda, R. D. Braatz, and R. C. Alkire. Coupled mesoscale-continuum simulations of copper electrodeposition in a trench. *AIChE J.*, 50:226-240, 2004.

72. J. G. VanAntwerp and R. D. Braatz. Discussion on design of cross-directional controllers with optimal steady-state performance. *European J. of Control*, 10:28-29, 2004 (invited).

73. R. C. Alkire and R. D. Braatz. Electrochemical engineering in an age of discovery and innovation. *AIChE J.*, 50:2000-2007, 2004 (invited, cover article).

74. E. Rusli, S. Ang, and R. D. Braatz. A quadruple tank process control experiment. *Chem. Eng. Edu.*, 38:171-181, 2004. Reprinted in *CACHE News*, 59, Fall 2004 (invited).

75. J. C. Pirkle, Jr. and R. D. Braatz. Comparison of the dynamic thin shell and quasi-cylindrical models for blown film extrusion. *Polymer Engineering & Science*, 44:1267-1276, 2004.

76. T. O. Drews, R. D. Braatz, and R. C. Alkire. Coarse-grained kinetic Monte Carlo simulation of copper electrodeposition with additives. *Int. J. Multiscale Computational Engineering*, 2:313-327, 2004.

77. T. Togkalidou, H.-H. Tung, Y. Sun, A. Andrews, and R. D. Braatz. Parameter estimation and optimization of a loosely-bound aggregating pharmaceutical crystallization using in-situ infrared and laser backscattering measurements. *Ind. Eng. Chem. Res.*, 43:6168-6181, 2004.

78. R. Gunawan, I. Fusman, and R. D. Braatz. High resolution algorithms for multidimensional population balance equations. *AIChE J.*, 50:2738-2749, 2004. **140+ citations**

79. M. Y. L. Jung, R. Gunawan, R. D. Braatz, and E. G. Seebauer. Pair diffusion and kick-out: Contributions to diffusion of boron in silicon. *AIChE J.*, 50:3248-3256, 2004.

80. E. Rusli**,** T. O. Drews, and R. D. Braatz. Systems analysis and design of dynamically coupled multiscale reactor simulation codes. *ISCRE Special Issue*, *Chem. Eng. Sci.*, 59:5607-5613, 2004.

81. R. D. Braatz, R. C. Alkire, T. O. Drews, and E. Rusli. Multiscale systems engineering with applications to chemical reaction processes. *ISCRE Special Issue*, *Chem. Eng. Sci.*, 59:5623-5628, 2004.

82. H. An, J. W. Eheart, and R. D. Braatz. Stability-oriented programs for regulating water withdrawals in riparian regions. *Water Resources Research*, 40:W12301, 2004.

83. M. Y. L. Jung, C. T. M. Kwok, R. D. Braatz, and E. G. Seebauer. Interstitial charge states in boron-implanted silicon. *J. Appl. Phys.*, 97:063520, 2005.

84. T. O. Drews, S. Krishnan, J. Alameda, D. Gannon, R. D. Braatz, and R. C. Alkire. Multi-scale simulations of copper electrodeposition onto a resistive substrate. *IBM J. Res. & Dev.*, 49:49-63, 2005.

85. M. Fujiwara, Z. K. Nagy, J. W. Chew, and R. D. Braatz. First-principles and direct design approaches for the control of pharmaceutical crystallization. *J. of Process Control*, 15:493-504, 2005 (invited). **190+ citations**

86. C. T. M. Kwok, K. Dev, R. D. Braatz, and E. G. Seebauer. A method for quantifying annihilation rates of bulk point defects at surfaces. *J. Appl. Phys.*, 98:013524, 2005.

87. E. J. Hukkanen, J. A. Wieland, D. E. Leckband, A. Gewirth, and R. D. Braatz. Multiple-bond kinetics from single-molecule pulling experiments: Evidence of multiple NCAM bonds. *Biophysical J.*, 89:3434-3445, 2005.

88. R. Vaidyanathan, M. Y. L. Jung, R. D. Braatz, and E. G. Seebauer. Measurement of defect-mediated diffusion: The case of silicon self-diffusion. *AIChE J.*, 52:366-370, 2006.

89. R. D. Braatz, R. C. Alkire, E. G. Seebauer, E. Rusli, R. Gunawan, T. O. Drews, and Y. He. Perspectives on the design and control of multiscale systems. *DYCOPS Special Issue*, *J. of Process Control*, 16:193-204, 2006 (invited).

90. E. Rusli, T. O. Drews, D. L. Ma, R. C. Alkire, and R. D. Braatz. Robust nonlinear feedback-feedforward control of a coupled kinetic Monte Carlo-finite difference simulation. *J. of Process Control*, 16:409-417, 2006.

91. G. X. Zhou, M. Fujiwara, X. Y. Woo, E. Rusli, H.-H. Tung, C. Starbuck, O. Davidson, Z. Ge, and R. D. Braatz. Direct design of pharmaceutical antisolvent crystallization through concentration control. *Crystal Growth & Design*, 6:892-898, 2006. **110+ citations**

92. T. O. Drews, A. Radisic, J. Erlebacher, R. D. Braatz, P. C. Searson, and R. C. Alkire. Stochastic simulation of the early stages of kinetically limited electrodeposition. *J. Electrochem. Soc.*, 153:C434-C441, 2006.

93. X. Y. Woo, R. B. H. Tan, P. S. Chow, and R. D. Braatz. Simulation of mixing effects in antisolvent crystallization using a coupled CFD-PDF-PBE approach. *Crystal Growth & Design*, 6:1291-1303, 2006.

94. R. D. Braatz, R. C. Alkire, E. G. Seebauer, T. O. Drews, E. Rusli, M. Karulkar, F. Xue, Y. Qin, M. Y. L. Jung, and R. Gunawan. A multiscale systems approach to microelectronic processes. *Special Issue on Chemical Process Control*, *Comput. Chem. Eng.*, 30:1643-1656, 2006 (invited).

95. E. G. Seebauer, K. Dev, M. Y. L. Jung, R. Vaidyanathan, C. T. M. Kwok, J. W. Ager, E. E. Haller, and R. D. Braatz. Control of defect concentrations within a semiconductor through adsorption. *Phys. Rev. Lett.*, 97:055503, 2006.

96. N. Nair, M. L. Usrey, W.-J. Kim, R. D. Braatz, and M. S. Strano. Deconvolution of the photo-absorption spectrum of single-walled carbon nanotubes with (n,m) resolution. *Analytical Chemistry*, 78:7689-7696, 2006.

97. X. Zhang, M. Yu, C. T. M. Kwok, R. Vaidyanathan, R. D. Braatz, and E. G. Seebauer. Precursor mechanism for interaction of bulk interstitial atoms with Si(100). *Phys. Rev. B*, 74:235301, 2006.

98. J. G. VanAntwerp, A. P. Featherstone, B. A. Ogunnaike, and R. D. Braatz. Cross-directional control of sheet and film processes. *Automatica*, 43:191-211, 2007.

99. X. Li, T. O. Drews, E. Rusli, F. Xue, Y. He, R. D. Braatz, and R. C. Alkire. The effect of additives on shape evolution during electrodeposition. Part I: Multiscale simulation with dynamically coupled kinetic Monte Carlo and moving-boundary finite-volume codes. *J. Electrochem. Soc.*, 154:D230-240, 2007. Correction *J. Electrochem. Soc.*, 154:S15, 2007.

100. Z. K. Nagy and R. D. Braatz. Distributional uncertainty analysis using power series and polynomial chaos expansions. *Special Issue on Advanced Control of Chemical Processes*, *J. of Process Control*, 17:229-240, 2007.

101. E. Rusli, F. Xue, T. O. Drews, P. Vereecken, P. Andracacos, H. Deligianni, R. D. Braatz, and R. C. Alkire. Effect of additives on shape evolution during electrodeposition. Part II: Parameter estimation from roughness evolution experiments. *J. Electrochem. Soc.*, 154:D584-D597, 2007.

102. M. W. Hermanto, M.-S. Chiu, X. Y. Woo, and R. D. Braatz. Robust optimal control of polymorphic transformation in batch crystallization. *AIChE J.*, 53:2643-2650, 2007.

103. T. O. Drews, R. D. Braatz, and R. C. Alkire. Monte Carlo simulation of kinetically-limited electrodeposition on a surface with metal seed clusters. *Special Issue in honor of Dieter Kolb*, *Z. Phys. Chem.*, 221:1287-1305, 2007.

104. J. G. VanAntwerp and R. D. Braatz. Discussion on GPC robust design using linear and/or bilinear matrix inequalities. *European J. of Control*, 13:468-472, 2007 (invited).

105. N. Nair, W.-J. Kim, R. D. Braatz, and M. S. Strano. Dynamics of surfactant-suspended single walled carbon nanotubes in a centrifugal field. *Langmuir*, 24:1790-1795, 2008.

106. Z. K. Nagy, J. W. Chew, M. Fujiwara, and R. D. Braatz. Comparative performance of concentration and temperature controlled batch crystallizations. *Festschrift honoring Prof. Dale Seborg*, *J. of Process Control*, 18:399-407, 2008 (invited). **90+ citations**

107. C. T. M. Kwok, K. Dev, E. G. Seebauer, and R. D. Braatz. Maximum a posteriori estimation of activation energies that control silicon self-diffusion. *Automatica*, 44:2241-2247, 2008.

108. Y. Qin, X. Li, F. Xue, P. Vereecken, P. Andricacos, H. Deligianni, R. D. Braatz, and R. C. Alkire. The effect of additives on shape evolution during copper electrodeposition. Part III. Trench infill for on-chip interconnects. *J. Electrochem. Soc.*, 155:D223-233, 2008.

109. Z. K. Nagy, M. Fujiwara, X. Y. Woo, and R. D. Braatz. Determination of the kinetic parameters for the crystallization of paracetamol from water using metastable zone width experiments. *Ind. Eng. Chem. Res.*, 47:1245-1252, 2008.

110. Z. Zheng, R. Stephens, R. D. Braatz, R. C. Alkire, and L. R. Petzold. A hybrid multiscale kinetic Monte Carlo method for simulation of copper electrodeposition. *J. Comput. Phys.*, 227:5184-5199, 2008.

111. R. Gunawan, I. Fusman, and R. D. Braatz. Parallel high resolution finite-volume simulation of particulate processes. *AIChE J.*, 54:1449-1458, 2008.

112. Z. K. Nagy, M. Fujiwara, and R. D. Braatz, Modelling and control of combined cooling and antisolvent crystallization processes. *Special Issue on Dynamics and Control of Process Systems*. *J. of Process Control*, 18:856-864, 2008 (invited).

113. M. W. Hermanto, N. C. Kee, R. B. H. Tan, M.-S. Chiu, and R. D. Braatz. Robust Bayesian estimation of the kinetics of the polymorphic crystallization of L-glutamic acid crystals. *AIChE J.*, 54:3248-3259, 2008.

114. N. C. S. Kee, X. Y. Woo, L. M. Goh, E. Rusli, G. He, V. Bhamidi, R. B. H. Tan, P. J. A. Kenis, C. F. Zukoski, and R. D. Braatz. Design of crystallization processes from laboratory research and development to the manufacturing scale: Part I. *Am. Pharm. Rev.*, 11(6):110-115, 2008 (invited).

115. N. C. S. Kee, X. Y. Woo, L. M. Goh, E. Rusli, G. He, V. Bhamidi, R. B. H. Tan, P. J. A. Kenis, C. F. Zukoski, and R. D. Braatz. Design of crystallization processes from laboratory research and development to the manufacturing scale. Part II. *Am. Pharm. Rev.*, 11(7):66-74, 2008 (invited).

116. X. Y. Woo, R. B. H. Tan, and R. D. Braatz. Modeling and computational fluid dynamics-population balance equation-micromixing simulation of impinging jet crystallizers. *Crystal Growth & Design*, 9:156-164, 2009.

117. X. Y. Woo, Z. K. Nagy, R. B. H. Tan, and R. D. Braatz. Adaptive concentration control of cooling and antisolvent crystallization with laser backscattering measurement. *Crystal Growth & Design*, 9:182-191, 2009.

118. M. W. Hermanto, R. D. Braatz, and M.-S. Chiu. High-order simulation of polymorphic crystallization using weighted essentially non-oscillatory methods. *AIChE J.*, 55:122-131, 2009.

119. C. T. M. Kwok, R. D. Braatz, S. Paul, W. Lerch, and E. G. Seebauer. Mechanistic benefits of millisecond annealing for diffusion and activation of boron in silicon. *J. Appl. Phys.*, 105:art. no. 063514, 2009.

120. N. C. S. Kee, R. B. H. Tan, and R. D. Braatz. Selective crystallization of the metastable alpha-form of L-glutamic acid using concentration feedback control. *Crystal Growth & Design*, 9:3044-3051, 2009.

121. N. C. S. Kee, P. D. Arendt, R. B. H. Tan, and R. D. Braatz. Selective crystallization of the metastable anhydrate form in the enantiotropic pseudo-dimorph system of L-phenylalanine using concentration feedback control. *Crystal Growth & Design*, 9:3052-3061, 2009.

122. M. W. Hermanto, M.-S. Chiu, and R. D. Braatz. Nonlinear model predictive control for the polymorphic crystallization of L-glutamic acid crystals. *AIChE J.*, 55:2631-2645, 2009.

123. T. Jin, Y. Ito, X. Luan, S. Dangaria, C. Walker, M. Allen, A. Kulkarni, C. Gibson, R. Braatz, X. Liao, and T. Diekwisch. Elongated polyproline motifs facilitate enamel evolution through matrix subunit compaction. *PLoS Biology*, 7(12):e1000262, 2009.

124. K. Chen, R. Vaidyanathan, E. G. Seebauer, and R. D. Braatz. General expression for effective diffusivity of foreign atoms migrating via a fast intermediate, *J. Appl. Phys.*, 107:026101, 2010.

125. C. T. M. Kwok, R. D. Braatz, S. Paul, W. Lerch, and E. G. Seebauer. An improved model for boron diffusion and activation in silicon. *AIChE J.*, 56:515-521, 2010.

126. J. C. Pirkle, Jr. and R. D. Braatz. A thin-shell two-phase microstructural model for blown film extrusion. *J. of Rheology*, 54:471-505, 2010.

127. V. R. Subramanian and R. D. Braatz. Current needs in electrochemical engineering education. *Electrochemical Society Interface*, 19(1):37-38, 2010 (invited).

128. L. M. Goh, K. J. Chen, V. Bhamidi, G. He, N. C. S. Kee, P. J. A. Kenis, C. F. Zukoski, and R. D. Braatz. A stochastic model for nucleation kinetics determination in droplet-based microfluidic systems. *Crystal Growth & Design*, 10:2515-2521, 2010.

129. J. C. Pirkle, Jr., M. Fujiwara, and R. D. Braatz. A maximum-likelihood parameter estimation for the thin-shell quasi-Newtonian model for a laboratory blown film extruder. *Special Issue in Honor of Thomas Edgar*, *Ind. Eng. Chem. Res.*, 47:8007-8015, 2010.

130. M. Kishida and R. D. Braatz. Worst-case analysis of distributed parameter systems with application to the 2D reaction-diffusion equation. *Special Issue on Optimal Process Control*, *Optimal Control Applications & Methods*, 31:433-449, 2010 (invited).

131. K. Chen, N. Nair, M. S. Strano, and R. D. Braatz. Identification for chirality-dependent adsorption kinetics in single-walled carbon nanotube reaction networks. *Special Issue on Nanoscale Simulation of Molecular and Biological Systems*, *J. of Computational & Theoretical Nanoscience*, 7:2581-2585, 2010 (invited).

132. V. Ramadesigan, R. N. Methekar, V. R. Subramanian, F. Latinwo, and R. D. Braatz. Optimal porosity distribution for minimized Ohmic drop across a porous electrode. *J. Electrochem. Soc.*, 157:A1328-A1334, 2010.

133. M. W. Hermanto, R. D. Braatz, and M.-S. Chiu. Integrated batch-to-batch and nonlinear model predictive control for polymorphic crystallization in pharmaceutical crystallization. *AIChE J.*, 57:1008-1019, 2011.

134. N. C. S. Kee, R. B. H. Tan, and R. D. Braatz. Semiautomated identification of the phase diagram for enantiotropic crystallizations using ATR-FTIR spectroscopy and laser backscattering. *Special Issue in Honor of C. C. Yu*, *Ind. Eng. Chem. Res.*, 50:1488-1495, 2011 (invited).

135. N. C. S. Kee, P. D. Arendt, L. M. Goh, R. B. H. Tan, and R. D. Braatz. Nucleation and growth kinetics estimation for *L*-phenylalanine hydrate and anhydrate crystallization. *CrystEngComm*, 13:1197-1209, 2011 (invited).

136. W. Y. Woo, R. B. H. Tan, and R. D. Braatz. Precise tailoring of the crystal size distribution by controlled growth and continuous seeding from impinging jet crystallizers. *CrystEngComm*, 13:2006-2014, 2011 (invited).

137. J. C. Pirkle, Jr. and R. D. Braatz. Instabilities and multiplicities in non-isothermal blown film extrusion including the effects of crystallization. *Special Issue in Honor of Thomas McAvoy*, *J. of Process Control*, 21:405-414, 2011 (invited).

138. R. N. Methekar, P. W. C. Northrup, K. Chen, R. D. Braatz, and V. R. Subramanian. Kinetic Monte Carlo simulation of surface heterogeneity in graphite electrodes for lithium-ion batteries: Passive layer formation. *J. Electrochem. Soc.*, 158:A363-A370, 2011.

139. V. Ramadesigan, V. Boovaragavan, M. Arabandi, N. A. Burns, K. Chen, R. D. Braatz, and V. R. Subramanian. Parameter estimation and capacity fade analysis of lithium-ion batteries using reformulated models. *J. Electrochem. Soc.*, 158:A1048-A1054, 2011.

140. Z. W. Ulissi, J. Zhang, A. A. Boghossian, N. F. Reuel, S. F. E. Shimizu, R. D. Braatz, and M. S. Strano. Applicability of birth-death Markov modeling for single molecule counting using single-walled carbon nanotube fluorescent sensor arrays. *J. Phys. Chem. Lett.*, 2:1690-1694, 2011.

141. A. A. Boghossian, J. Zhang, F. T. Le Floch, Z. W. Ulissi, P. Bojo, J.-H. Han, J.-H. Kim, J. R. Arkalgud, N. F. Reuel, R. D. Braatz, and M. S. Strano. The chemical dynamics of nanosensors capable of single molecule detection. *J. Chem. Phys.*, 135:art no. 084124, 2011.

142. V. Ramadesigan, P. W. C. Northrop, S. De, S. Santhanagopalan, R. D. Braatz, V. R. Subramanian. Modeling and simulation of lithium-ion batteries from a systems engineering perspective. *J. Electrochem. Soc.*, 159:R31-R45, 2012. **85+ citations**

143. Z. K. Nagy and R. D. Braatz. Advances and future directions in crystallization control. *Annu. Rev. Chem. Biomol. Eng.*, 3:55-75, 2012 (invited).

144. K. K. K. Kim, E. Rios-Patron, and R. D. Braatz. Robust nonlinear internal model control of Wiener systems. *Special Issue in Honor of Kenneth Muske*, *J. of Process Control*, 22:1468-1477 (invited).

145. M. Jiang, M. H. Wong, Z. Zhu, J. Zhang, L. Zhou, K. Wang, A. N. Ford Versypt, T. Si, L. M. Hasenberg, Y.-E. Li, and R. D. Braatz. Towards achieving a flattop crystal size distribution by continuous seeding and controlled growth. *Chem. Eng. Sci.*, 77:2-9, 2012.

146. K. Chen, L. M. Goh, G.W. He, P. J. A. Kenis, C. F. Zukoski, and R. D. Braatz. Identification of nucleation rates in droplet-based microfluidic systems. *Chem. Eng. Sci.*, 77:235-241, 2012.

147. L. Goh, M. Kishida, and R. D. Braatz. On the analysis of robust stability of metabolic pathways. *IEEE Control Systems*, 32(4):92-94, 2012.

148. Z. W. Ulissi, M. S. Strano, and R. D. Braatz. Control of nano and microchemical systems. *Special Issue on Chemical Process Control*, *Comput. Chem. Eng.*, 51:149-156, 2013 (invited). CACE Most Downloaded Articles, Sept 2012 – Aug 2013.

149. M. Kishida, A. N. Ford Versypt, D. W. Pack, and R. D. Braatz. Optimal control of one-dimensional cellular uptake in tissue engineering. *Optimal Control Applications & Methods*, 34:680-695, 2013.

150. L. Zhou, M. Su, B. Benyahia, A. Singh, P. I. Barton, B. L. Trout, A. S. Myerson, and R. D. Braatz. Mathematical modeling and design of layer crystallization in a concentric annulus with and without recirculation. *AIChE Journal*, 59:1308-1321, 2013.

151. E. P. Chang, R. D. Braatz, and A. T. Hatton. Pervaporation of emulsion droplets for the templated assembly of spherical particles: A population balance model. *AIChE Journal*, 59:3975-3985, 2013.

152. K.-K. K. Kim and R. D. Braatz. Generalised polynomial chaos expansion approaches to approximate stochastic model predictive control. MPC Special Issue, *International Journal of Control*, 86:1324-1337, 2013.

153. M. L. Rasche and R. D. Braatz. The pitfalls of readily available solutions: Physically consistent global analysis of species transport from a spherical particle. *IEEE Control Systems*, 33(5):54-56, 2013.

154. K.-K. K. Kim, D. E. Shen, Z. K. Nagy, and R. D. Braatz. Wiener's polynomial chaos for the analysis and control of nonlinear dynamical systems with probabilistic uncertainties. *IEEE Control Systems*, 33(5):58-67, 2013.

155. M. Molaro and R. D. Braatz. Speeding up Matlab$^®$ programs by orders of magnitude. *IEEE Control Systems*, 33(6):135+, 2013.

156. S. Mascia, P. L. Heider, H. Zhang, R. Lakerveld, B. Benyahia, P. I. Barton, R. D. Braatz, C. L. Cooney, J. M. B. Evans, T. F. Jamison, K. F. Jensen, A. S. Myerson, and B. L. Trout. End-to-end continuous manufacturing of pharmaceuticals: Integrated synthesis, purification, and final dosage formation. *Angewandte Chemie*, 52(47):12359-12363, 2013. **Hot Paper. Research Highlight in *Nature***, 502:274, 2013 (doi:10.1038/502274d).

157. R. Lakerveld, B. Benyahia, R. D. Braatz, and P. I. Barton. Model-based design of a plant-wide control strategy for a continuous pharmaceutical plant. *AIChE Journal*, 59:3671-3685, 2013.

158. R. Lakerveld, B. Benyahia, P. L. Heider, H. Zhang, R. D. Braatz, and P. I. Barton. Averaging level control to reduce off-spec material in a continuous pharmaceutical pilot plant. *Processes*, 1:330-348, 2013.

159. A. N. Ford Versypt, D. W. Pack, and R. D. Braatz. Mathematical modeling of drug delivery from autocatalytically degradable PLGA microspheres—A review. *Journal of Controlled Release*, 165:29-37, 2013.

160. M. Kishida, P. Rumschinski, R. Findeisen, and R. D. Braatz. Efficient polynomial-time outer bounds on state trajectories for uncertain polynomial systems using skewed structured singular values. *IEEE Trans. on Automatic Control*, 59:3063-3068, 2014.

161. M. Kishida and R. D. Braatz. Skewed structured singular value-based approach for the construction of design spaces: Theory and applications. *IET Control Theory & Applications*, 8(14):1321-1327, 2014.

162. Q.-L. Su, R. D. Braatz, and M.-S. Chiu. Modeling and Bayesian parameter estimation for semibatch pH-shift reactive crystallization of L-glutamic acid. *AIChE Journal*, 60(8): 2828-2838, 2014.

163. K.-K. K. Kim and R. D. Braatz. Observer-based output feedback control of discrete-time Luré systems with sector-bounded slope-restricted nonlinearities. *Int. J. of Robust & Nonlinear Control*, 24:2458-2472, 2014.

164. K.-K. K. Kim, S. Skogestad, M. Morari, and R. D. Braatz. Necessary and sufficient conditions for robust reliable control in the presence of model uncertainties and system component failures. Manfred Morari Special Issue, *Comput. Chem. Eng.*, 70:67-77, 2014.

165. K.-K. K. Kim and R. D. Braatz. Computational complexity and related topics of robustness margin calculation using μ theory: A review of theoretical developments. Manfred Morari Special Issue, *Comput. Chem. Eng.*, 70:122-132, 2014.

166. K.-K. K. Kim, K. S. Cheong, K. Chen, and R. D. Braatz. Analysis of a synthetic gene switching motif: Systems and control approaches. ADCHEM Special Issue, *Journal of Process Control*, 24:341-347, 2014.

167. J. K. Scott, R. Findeisen, R. D. Braatz, and D. M. Raimondo. Input design for guaranteed fault diagnosis using zonotopes. *Automatica*, 50:1580-1589, 2014.

168. H. Jang, J. H. Lee, K.-K. K. Kim, and R. D. Braatz. Fast moving horizon estimation for a two-dimensional distributed parameter system. *Comput. Chem. Eng.*, 63:159-172, 2014.

169. A. N. Ford Versypt and R. D. Braatz. Analysis of finite difference discretization schemes for diffusion in spheres with variable diffusivity. *Comput. Chem. Eng.*, 71:241-252, 2014.

170. X. Zhu, D. W. Pack, and R. D. Braatz. Modelling intravascular delivery from drug-eluting stents with biodurable coating: Investigation of anisotropic vascular drug diffusivity and arterial drug distribution. *Computer Methods in Biomechanics and Biomedical Engineering*, 17(3):187-198, 2014.

171. J. Min, R. D. Braatz, and P. T. Hammond. Tunable staged release of therapeutics from layer-by-layer coatings with clay barrier interlayer. *Biomaterials*, 35(8), 2507-2517, 2014.

172. Q.-L. Su, R. D. Braatz, and M.-S. Chiu. Concentration control for semi-batch pH-shift reactive crystallization of L-glutamic acid. ADCHEM Special Issue, *Journal of Process Control*, 24:415-421, 2014.

173. M. Jiang, X. Zhu, M. C. Molaro, M. L. Rasche, H. Zhang, K. Chadwick, D. M. Rainmondo, K.-K. K. Kim, L. Zhou, Z. Zhu, M. H. Wong, D. O'Grady, D. Hebrault, J. Tedesco, and R. D. Braatz. Modification of crystal shape through deep temperature cycling. David Himmelblau and Gary Powers Memorial Special Issue, *Ind. Eng. Chem. Res.*, 53:5325-5336, 2014.

174. B. Suthar, V. Ramadesigan, S. De, R. D. Braatz, and V. R. Subramanian. Optimal charging profiles for mechanically constrained lithium-ion batteries. *Physical Chemistry Chemical Physics*, 16:277-287, 2014.

175. X. Zhu and R. D. Braatz. 2D contribution map for fault identification. *IEEE Control Systems*, 33(5):72-77, 2014.

176. M. Jiang, Z. Zhu, E. Jimenez, J. Xu, C. Papageorgiou, J. Waetzig, A. Hardy, and R. D. Braatz. Continuous-flow tubular crystallization in slugs spontaneously induced by hydrodynamics. *Crystal Growth & Design*, 14:851-860, 2014.

177. A. Mesbah, A. N. Ford Versypt, X. Zhu, and R. D. Braatz. Nonlinear model-based control of thin-film drying for continuous pharmaceutical manufacturing. John Congalidis Memorial Special Issue, *Ind. Eng. Chem. Res.*, 53(18):7447-7460, 2014.

178. H. T. Zhang, R. Lakerveld, P. L. Heider, M. Y. Tao, M. Su, C. J. Testa, A. N. D'Antonio, P. I. Barton, R. D Braatz, B. L. Trout, A. S. Myerson, K. F. Jensen, and J. M. B. Evans. Application of continuous crystallization in an integrated continuous pharmaceutical pilot plant. *Crystal Growth & Design*, 14(5):2148-2157, 2014.

179. X. Zhu and R. D. Braatz. Modeling and analysis of drug-eluting stents with biodegradable PLGA coating: Consequences on intravascular drug delivery. *Journal of Biomechanical Engineering*, 136(11):111004, 2014.

180. P. W. C. Northrop, B. Suthar, V. Ramadesigan, S. Santhanagopalan, R. D. Braatz, and V. R. Subramanian. Efficient simulation of lithium-ion battery models for enabling electric transportation. *J. Electrochem. Soc.*, 161(8):E3149-E3157, 2014.

181. B. Suthar, P. W. C. Northrop, R. D. Braatz, and V. S. Subrahmanian. Optimal charging profiles with minimal intercalation-induced stresses for lithium-ion batteries using reformulated pseudo 2-dimensional models. *J. Electrochem. Soc.*, 161(11):F3144-F3155, 2014.

182. X. Zhu and R. D. Braatz. A mechanistic model for drug release in PLGA biodegradable stent coatings coupled with polymer degradation and erosion. *Journal of Biomedical Materials Research: Part A*, 103(7):2269-2279, 2015.

183. I. R. Baxendale, R. D. Braatz, B. K. Hodnett, K. F. Jensen, M. D. Johnson, P. Sharratt, J.-P. Sherlock, and A. J. Florence. Achieving continuous manufacturing: Technologies and approaches for synthesis, work-up and isolation of drug substance. *Journal of Pharmaceutical Sciences*, 104(3):781-791, 2015.

184. A. T. Myerson, M. Krumme, M. Nasr, H. Thomas, and R. D. Braatz. Control systems engineering in continuous pharmaceutical processing. *Journal of Pharmaceutical Sciences*, 104(3):832-839, 2015.

185. B. Jiang, D. Huang, X. Zhu, F. Yang, and R. D. Braatz. Canonical variate analysis-based contributions for fault identification. *Journal of Process Control*, 26:17-25, 2015.

186. J. A. Paulson, A. Mesbah, X. Zhu, M. C. Molaro, and R. D. Braatz. Control of self-assembly in micro- and nanoscale systems. *Journal of Process Control*, 27:38-49.

187. B. Jiang, X. Zhu, D. Huang, J. A. Paulson, and R. D. Braatz. A combined canonical variate analysis and Fisher discriminant analysis (CVA-FDA) approach for fault diagnosis. *Comput. Chem. Eng.*, 77:1-9, 2015.

188. Y. Son, Q. H. Wang, J. Paulson, C.-J. Shih, A. Rajan, K. Tvrdy, S. Kim, B. Alfeeli, R. Braatz; and M. Strano. Layer number dependence of MoS_2 photoconductivity using photocurrent spectral atomic force microscopic imaging. *ACS Nano*, 9:2843-2855, 2015.

189. L. L. Simon, H. Pataki, G. Marosi, F. Meemken, K. Hungerbühler, A. Baiker, S. Tummala, B. Glennon, M. Kuentz, G. Steele, H. J. M. Kramer, J. W. Rydzak, Z. Chen, J. Morris, F. Kjell, R. Singh, R. Gani, K. V. Gernaey, M. Louhi-Kultanen, J. O'Reilly, N. Sandler, O. Antikainen, J. Yliruusi, P. Frohberg, J. Ulrich, R. D. Braatz, T. Leyssens, M. von Stosch, R. Oliveira, R. B. H. Tan, H. Wu, M. Khan, D. O'Grady, A. Pandey, R. Westra, E. Delle-Case, D. Pape, D. Angelosante, Y. Maret, O. Steiger, M. Lenner, K. Abbou-Oucherif, Z. K. Nagy, J. D. Litster, V. K. Kamaraju, and M.-S. Chiu. Assessment of recent process analytical technology (PAT) trends: A multiauthor review. *Org. Process Res. Dev.*, 19:3-62, 2015.

190. M. Kishida, D. W. Pack, and R. D. Braatz. Optimal spatial field control for controlled release. *Optimal Control Applications and Methods*, online on January 19, 2015, DOI: 10.1002/oca.2159.

191. M. Kishida and R. D. Braatz. Ellipsoidal bounds on state trajectories for discrete-time systems with linear fractional uncertainties. *Optimization and Engineering*. DOI: 10.1007/s11081-014-9255-9. Online on March 2014.

192. L. H. Chiang, B. Jiang, X. Zhu, D. Huang, and R. D. Braatz. Diagnosis of multiple and unknown faults using the causal map and multivariate statistics. *Journal of Process Control*, 28:27-39, 2015.

193. Mo Jiang, C. D. Papageorgiou, J. Waetzig, A. Hardy, M. Langston, and R. D. Braatz. Indirect ultrasonication in continuous slug-flow crystallization. *Crystal Growth & Design*, 15(5):2486–2492, 2015.

194. K. A. Severson, J. G. VanAntwerp, V. Natarajan, C. Antoniou, J. Thömmes, and R. D. Braatz. Elastic net with Monte Carlo sampling for data-based modeling in biopharmaceutical manufacturing facilities. *Comput. Chem. Eng.*, 80:30-36, 2015.

195. R. Lakerveld, B. Benyahia, P. L. Heider, H. Zhang, A. Wolfe, C. Testa, S. Ogden, D. R. Hersey, S. Mascia, J. M. B. Evans, R. D. Braatz, and P. I. Barton. The application of an

automated control strategy for an integrated continuous pharmaceutical pilot plant. *Organic Process Research & Development*, online on August 1, 2014. DOI: 10.1021/op500104d.

196. L. H. Chiang, B. Jiang, X. Zhu, D. Huang, and R. D. Braatz. Diagnosis of multiple and unknown faults using the causal map and multivariate statistics. *Journal of Process Control*, accepted on February 19, 2015.

197. M.-J. Kim, R. D. Braatz, J. T. Kim, and C.-K. Yoo. "Indoor air quality control for improving passenger health in subway platforms using an outdoor air quality dependent ventilation system," Indoor air quality control for improving passenger health in subway platforms using an outdoor air quality dependent ventilation system. *Building and Environment*, 92:407-417, 2015.

198. Zhilong Zhu, You Peng, Richard D. Braatz, and Allan S. Myerson. Gypsum crystallization during phosphoric acid production: Modeling and experiments using the MSE thermodynamic model. *Ind. Eng. Chem. Res.*, in press http://dx.doi.org/10.1021/acs.iecr.5b01763

199. B. Jiang, X. Zhu, D. Huang, and R. D. Braatz. Canonical variate analysis-based monitoring of process correlation structure using causal feature representation. *Journal of Process Control*, 32:109-116, 2015.

200. J. C. Pirkle, Jr., L. C. Foguth, S. J. Brenek, K. Girard, and R. D. Braatz. Computational fluid dynamics modeling of mixing effects for crystallization in coaxial nozzles. *Chem. Eng. Proc.: Process Intensification* (invited). DOI: 10.1016/j.cep.2015.07.006, in press.

201. M. Kishida and R. D. Braatz. Quality-by-Design by skewed spherical structured singular value. *IET Control Theory & Applications*, DOI:10.1049/iet-cta.2014.1235, available online on July 15, 2015.

202. A. N. Ford Versypt, P. D. Arendt, D. W. Pack, and R. D. Braatz. Derivation of an analytical solution to a reaction-diffusion model for autocatalytic degradation and erosion in polymer microspheres. *PLOS ONE*, in press.

203. B. Jiang, C. Gu, and R. D. Braatz. Understanding temperature-induced primary nucleation in dual impinging jet mixers. *Chemical Engineering and Processing: Process Intensification*, in press. Available on-line on July 13, 2015. doi:10.1016/j.cep.2015.06.013

204. M. Jiang, D. Li, H.-H. Tung, and R. D. Braatz. Effect of jet velocity on crystal size distribution from antisolvent and cooling crystallizations in a dual impinging jet mixer. Special Issue on Continuous Crystallisation. *Chem. Eng. Proc.: Process Intensification*, in press.

E. Patents/Technology Disclosures

1. R. D. Braatz and J. G. VanAntwerp. Fast Model Predictive Ellipsoid Control Process, U.S. Patent #6,064,809, May 16, 2000.

2. E. G. Seebauer, R. D. Braatz, M. Y. L. Jung, and R. Gunawan. Methods for Controlling Dopant Concentration and Activation in Semiconductor Structures, U.S. Patent #7,846,822, December 7, 2010.

3. S. Ferguson, M. Su, L. Zhou, B. L. Trout, A. S. Myerson, and R. D. Braatz. Crystallization for Filtration Avoidance. Submitted MIT Technology Disclosure to OSP in last July 2014 for consideration.

F. Proceedings Papers

1. R. D. Braatz and M. Morari. mu-sensitivities as an aid for robust identification. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 231-236, 1991.
2. R. D. Braatz and M. Morari. Robust control for a noncolocated spring-mass system. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 2061-2062, 1992.
3. R. D. Braatz, M. L. Tyler, M. Morari, F. R. Pranckh, and L. Sartor. Identification and cross-directional control of coating processes: Theory and experiments. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 1556-1560, 1992.
4. R. D. Braatz, P. M. Young, J. C. Doyle, and M. Morari. Computational complexity of mu calculation. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 1682-1683, 1993.
5. M. Hovd, R. D. Braatz, and S. Skogestad. On the structure of the robust optimal controller for a class of problems. *Proceedings of the IFAC World Congress*, Elsevier Science, Tarrytown, NY, vol. IV, 27-30, 1993.
6. R. D. Braatz. A reconciliation between quantitative feedback theory and robust multivariable control. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 3374-3378, 1994.
7. R. D. Braatz, J. H. Lee, and M. Morari. Screening plant designs and control structures for uncertain systems. *IFAC Workshop on the Integration of Process Design and Control*, Baltimore, Maryland, 242-247, 1994.
8. R. D. Braatz, M. Morari, and S. Skogestad. Robust reliable decentralized control. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 3384-3388, 1994.
9. R. D. Braatz, B. A. Ogunnaike, J. S. Schwaber, and W. C. Rose. Autoregulation in industrial processes. *Proceedings of the IFAC Symposium on Modeling and Control in Biomedical Systems*, Galveston, TX, 127-128, 1994.
10. R. D. Braatz, B. A. Ogunnaike, J. S. Schwaber, and W. C. Rose. Autoregulatory feedback in industrial process designs. *Foundations of Computer Aided Process Design*, edited by L. T. Biegler and M. F. Doherty, AIChE Symposium Series, vol. 91, no. 304, AIChE Press, New York, 317-320, 1995.
11. M. Hovd, R. D. Braatz, and S. Skogestad. SVD controllers for H_2, H-infinity, and mu-optimal control. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 1233-1237, 1994.
12. A. P. Featherstone and R. D. Braatz. Control relevant identification of sheet and film processes. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 2692-2696, 1995.
13. R. D. Braatz and J. G. VanAntwerp. Advanced cross-directional control. *Control Systems '96 Preprints*, Halifax, Nova Scotia, Canada, 15-18, 1996.
14. R. D. Braatz, B. A. Ogunnaike, and A. P. Featherstone. Identification, estimation, and control of sheet and film processes. *Proceedings of the IFAC World Congress*, Elsevier Science Inc., Tarrytown, NY, 319-324, 1996.

15. R. D. Braatz and J. G. VanAntwerp. Robust cross-directional control of large scale paper machines. *Proceedings of the IEEE International Conference on Control Applications*, IEEE Press, Piscataway, NJ, 155-160, 1996.
16. A. P. Featherstone and R. D. Braatz. An integrated identification and control procedure for sheet and film processes. *Proceedings of the 34th Annual Allerton Conference on Communication, Control, and Computing*, Monticello, IL, 970-979, 1996.
17. R. D. Braatz. The current status of sheet and film process control. *Fifth International Conference on Chemical Process Control*, edited by J. C. Kantor, C. E. Garcia, and B. Carnahan, AIChE Symposium Series, vol. 93, no. 316, AIChE Press, New York, 327-330, 1997.
18. R. D. Braatz. Session summary: Poster session. *Fifth International Conference on Chemical Process Control*, edited by J. C. Kantor, C. E. Garcia, and B. Carnahan, AIChE Symposium Series, vol. 93, no. 316, AIChE Press, New York, 352, 1997.
19. J. G. VanAntwerp, R. D. Braatz, and N. V. Sahinidis. Globally optimal robust reliable control of large scale paper machines. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 1473-1477, 1997.
20. J. G. VanAntwerp, R. D. Braatz, and N. V. Sahinidis. Robust nonlinear control of plasma etching. *Proceedings of the Electrochemical Society*, Montreal, Canada, vol. 10, 454-462, 1997.
21. J. G. VanAntwerp, R. D. Braatz, and N. V. Sahinidis. Globally optimal robust control for systems with nonlinear time-varying perturbations. *Comput. Chem. Eng.*, vol. 21, S125-S130, 1997.
22. A. P. Featherstone and R. D. Braatz. Integrated robust identification and control of large scale processes. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 1225-1229, 1998.
23. E. Rios-Patron and R. D. Braatz. Global stability analysis for discrete-time nonlinear systems. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 338-342, 1998.
24. E. L. Russell and R. D. Braatz. Fault isolation in industrial processes using Fisher discriminant analysis. *Foundations of Computer-Aided Process Operations*, edited by J. F. Pekny and G. E. Blau, AIChE Symposium Series, vol. 94, no. 320, AIChE Press, New York, 380-385, 1998.
25. J. G. VanAntwerp and R. D. Braatz. Model predictive control of large scale processes. *Dynamics and Control of Process Systems*, Elsevier Science, Kidlington, United Kingdom, 153-158, 1999.
26. E. Rios-Patron and R. D. Braatz. Robust nonlinear control of a pH neutralization process. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 119-124, 1999.
27. T. Togkalidou and R. D. Braatz. Inferential modeling in pharmaceutical crystallization. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 2548-2552, 1999.
28. D. L. Ma, S. H. Chung, and R. D. Braatz. Worst-case performance analysis of optimal batch control trajectories. *Proceedings of the European Control Conference*, IFAC, Germany, paper F1011-2, 1999.

29. J. G. VanAntwerp and R. D. Braatz. Linear and bilinear matrix inequalities in chemical process control. *Proceedings of the European Control Conference*, IFAC, Germany, paper F1011-4, 1999.
30. M. Y. L. Jung, R. Gunawan, R. D. Braatz, and E. G. Seebauer. New physics for modeling transient enhanced diffusion in RTP. *Rapid Thermal and Other Short-Time Processing Technologies II*, The Electrochemical Society, vol. 2000-9, 15-20, 2000.
31. D. L. Ma and R. D. Braatz. Robust batch control of multidimensional crystal growth. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 1737-1741, 2000.
32. J. G. VanAntwerp, D. L. Ma, and R. D. Braatz. When is constrained control necessary for large scale processes? *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 4244-4248, 2000.
33. T. Togkalidou and R. D. Braatz. A bilinear matrix inequality approach to the robust nonlinear control of chemical processes. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 2548-2552, 2000.
34. T. Togkalidou, M. Fujiwara, S. Patel, and R. D. Braatz. A robust chemometrics approach to inferential modeling of particulate processes. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 1732-1736, 2000.
35. M. Hovd and R. D. Braatz. On the computation of disturbance rejection measures. *Proceedings of the International Symposium on Advanced Control of Chemical Processes*, Elsevier Science, Kidlington, United Kingdom, vol. 1, 63-68, 2000.
36. R. D. Braatz, M. Fujiwara, T. Togkalidou, D. L. Ma, S. D. Patel, E. M. Tsui, C. G. Lentz. Teaching the design of particulate processes. *Proceedings of the Educational Topical Conference*, *AIChE Annual Meeting*, Los Angeles, CA, paper 60b, 2000.
37. S. Ang, M. R. Johnson, and R. D. Braatz. Control of a multivariable pH neutralization process. *Proceedings of the Educational Topical Conference*, *AIChE Annual Meeting*, Los Angeles, CA, paper 61a, 2000.
38. R. D. Braatz, M. Fujiwara, T. Togkalidou, D. L. Ma, S. D. Patel, E. M. Tsui, and C. G. Lentz. Laboratory development for teaching process design. *Proceedings of the ASEE IL/IN Sectional Conference*, West Lafayette, IN, paper S4-2, 2001.
39. M. Hovd and R. D. Braatz. On the use of soft constraints in MPC controllers for plants with inverse response. *Proceedings of the 6th IFAC Symposium on Dynamics and Control of Process Systems*, Jejudo Island, Korea, paper C104, 2001.
40. M. Hovd and R. D. Braatz. Handling state and output constraints in MPC controllers using time-dependent weights. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 2418-2423, 2001.
41. R. Gunawan, E. L. Russell, and R. D. Braatz. Robustness analysis of multivariable systems with time delays. *Proceedings of the European Control Conference*, Porto, Portugal, 1882-1887, 2001.
42. R. D. Braatz and S. Hasebe. Particle size and shape control in crystallization processes. *Sixth International Conference on Chemical Process Control*, edited by In J. B. Rawlings, B. A. Ogunnaike, and J. W. Eaton, AIChE Symposium Series, vol. 98, no. 326, AIChE Press, New York, pages 307-327, 2002.
43. M. Fujiwara, D. L. Ma, T. Togkalidou, D. K. Tafti, and R. D. Braatz. Identification of pharmaceutical crystallization processes. *Proceedings of the 15th IFAC World Congress*, Elsevier Science, Oxford, United Kingdom, paper T-Fr-A11 1, 2002.

44. K. Lee, J. H. Lee, M. Fujiwara, D. L. Ma, and R. D. Braatz. Run-to-run control of multidimensional crystal size distribution in a batch crystallizer. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 1013-1018, 2002.

45. R. Gunawan, M. Y. L. Jung, R. D. Braatz, and E. G. Seebauer. Systems analysis applied to modeling dopant activation and TED in rapid thermal annealing. *Proceedings of the 10th IEEE International Conference on Advanced Thermal Processing of Semiconductors*, IEEE Press, Vancouver, Canada, 107-110, 2002.

46. T. Togkalidou, H. Tung, Y. Sun, A. T. Andrews, and R. D. Braatz. Model-based experimental design for cooling crystallization of a pharmaceutical compound. *Proceedings of the 15th International Symposium on Industrial Crystallization*, *Chemical Engineering Transactions*, edited by A. Chianese, Sorrento, Italy, vol. 1, 1497-1502, 2002.

47. R. D. Braatz, R. C. Alkire, E. G. Seebauer, T. O. Drews, R. Gunawan, and M. Y. L. Jung. Systems engineering of materials manufacturing processes at the nanoscale. *Proceedings of the 3rd Chemical Engineering Conference for Collaborative Research in Eastern Mediterranean*, Thessaloniki, Greece, paper W-4.3, 2003.

48. R. Gunawan, M. Y. L. Jung, R. D. Braatz, and E. G. Seebauer. Systems analysis applied to modeling dopant activation and TED in rapid thermal annealing. *Proceedings of the 7th International Workshop on the Fabrication, Characterization, and Modeling of Ultra Shallow Doping Profiles in Semiconductors*, Santa Cruz, CA, 293-298, 2003.

49. Z. K. Nagy, J. W. Chew, M. Fujiwara, and R. D. Braatz. Automated direct design of pharmaceutical crystallization. *Proceedings of the Topical Conference on Discovery, Development, and Delivery of Medicines*, *AIChE Annual Meeting*, San Francisco, CA, paper 1c, 2003.

50. T. O. Drews, A. Radisic, J. Erlebacher, R. D. Braatz, P. C. Searson, and R. C. Alkire, Atomic-scale Kinetic Monte Carlo simulations of copper nucleation: Investigation of attachment limited rate laws. *Proceedings of the Topical Conference on Electrodeposition Processes*, *AIChE Annual Meeting*, San Francisco, CA, paper 189a, 2003.

51. T. O. Drews, F. Xue, X. Li, H. Deligianni, P. Vereecken, E. Cooper, P. Andricacos, R. D. Braatz, and R. C. Alkire. Parameter estimation of a copper electrodeposition additive mechanism using data obtained from a D-optimal experimental design. *Proceedings of the Topical Conference on Electrodeposition Processes*, *AIChE Annual Meeting*, San Francisco, CA, paper 189b, 2003.

52. X. Y. Woo, R. Tan, and R. D. Braatz. Deforming mesh finite volume modeling of semi-batch mixing effects in antisolvent crystallization. *Proceedings of the Topical Conference on Discovery, Development, and Delivery of Medicines*, *AIChE Annual Meeting*, San Francisco, CA, paper 366d, 2003.

53. X. Y. Woo, P. S. Chow, R. B. H. Tan, and R. D. Braatz. CFD modeling of semibatch mixing effects in antisolvent crystallization. *Proceedings of the Second Asian Particle Technology Symposium*, Penang, Malaysia, paper SING-2, 2003.

54. R. Gunawan, M. Y. L. Jung, E. G. Seebauer, and R. D. Braatz. Optimal control of transient enhanced diffusion. *Proceedings of the IFAC Symposium on Advanced Control of Chemical Processes*, Hong Kong, 603-608, 2004.

55. E. Rusli, T. O. Drews, D. L. Ma, R. C. Alkire, and R. D. Braatz. Nonlinear feedback control of a coupled kinetic Monte Carlo-finite difference simulation. *Proceedings of the*

IFAC Symposium on Advanced Control of Chemical Processes, Hong Kong, 597-602, 2004.

56. Z. K. Nagy, J. W. Chew, M. Fujiwara, and R. D. Braatz. Advances in the modeling and control of batch crystallizers. *Proceedings of the IFAC Symposium on Advanced Control of Chemical Processes*, *Hong Kong*, 83-90, 2004.

57. J. Buell, D. Harnisch, B. Bruce, S. Comstock, and R. Braatz. New tools supporting new partnerships: Technology development with the NSF GK-12. *Proceedings of the Society for Information Technology & Teacher Education International Conference*, edited by C. Crawford et al., Association for the Advancement of Computing in Education, Chesapeake, VA, 4614-4618, 2004.

58. D. Harnisch, S. Comstock, B. Bruce, J. Buell, and R. Braatz. Development of professional learning communities: Factors within the NSF GK-12 program. *Proceedings of the Society for Information Technology & Teacher Education International Conference*, edited by C. Crawford et al., Association for the Advancement of Computing in Education, Chesapeake, VA, 2887-2891, 2004.

59. R. D. Braatz, M. Fujiwara, E. J. Hukkanen, J. C. Pirkle, Jr., T. Togkalidou, and R. Gunawan. A holistic approach to chemical process design and development. *Proceedings of the ASEE Annual Conference and Exposition*, Salt Lake City, UT, paper 1413.1, 2004.

60. E. Rusli, T. O. Drews, and R. D. Braatz. Control systems analysis of a multiscale simulation code for copper electrodeposition. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 4243-4248, 2004.

61. R. D. Braatz, R. C. Alkire, E. Seebauer, E. Rusli, R. Gunawan, T. O. Drews, X. Li, and Y. He. Perspectives on the dynamics and control of multiscale systems. *Proceedings of the International Symposium on Dynamics and Control of Process Systems*, Cambridge, MA, paper 96, 2004.

62. T. O. Drews, E. Rusli, Y. He, X. Li, R. C. Alkire, and R. D. Braatz. Simulation of copper nanostructure formation by coupling kinetic Monte Carlo simulation, continuum models, and the level set method. *Proceedings of the Topical Conference on Coupling Theory, Molecular Simulations and Computational Chemistry to the Physical World*, *AIChE Annual Meeting*, Austin, TX, paper 439a, 2004.

63. Y. He, J. R. Gray, R. C. Alkire, and R. D. Braatz. Predictor-corrector methods for dynamically coupling multiscale simulation codes. *Proceedings of the Topical Conference on Coupling Theory, Molecular Simulations and Computational Chemistry to the Physical World*, *AIChE Annual Meeting*, Austin, TX, paper 439b, 2004.

64. E. Rusli and R. D. Braatz. Design of an optimal overlap algorithm for dynamically coupling continuum and noncontinuum codes in multiscale simulation. *Proceedings of the Topical Conference on Coupling Theory, Molecular Simulations and Computational Chemistry to the Physical World*, *AIChE Annual Meeting*, Austin, TX, paper 439g, 2004.

65. E. Rusli, T. O. Drews, D. L. Ma, R. C. Alkire, and R. D. Braatz. Nonlinear feedback-feedforward control of a coupled KMC-finite difference simulation. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 2548-2553, 2005.

66. E. J. Hukkanen and R. D. Braatz. Identification of particle-particle interactions in suspension polymerization reactors. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 925-930, 2005.

67. E. J. Hukkanen and R. D. Braatz. Worst-case and distributional robustness analysis of the full molecular weight distribution during free radical bulk polymerization. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 3115-3120, 2005.

68. E. J. Hukkanen, J. Wieland, D. Leckband, and R. D. Braatz. Maximum likelihood estimation of multiple-bond kinetics from single-molecule pulling experiments. *Proceedings of the American Control Conference*, IEEE Press, Piscataway, NJ, 3265-3270, 2005.

69. M. Karulkar, Y. He, R. C. Alkire, and R. D. Braatz. Guidelines for the design of multiscale simulation codes. *Proceedings of the Topical Conference on Multiscale Analysis in Chemical, Materials and Biological Processes*, *AIChE Annual Meeting*, Cincinnati, OH, paper 503a, 2005.

70. C. T. M. Kwok, K. Dev, E. G. Seebauer, and R. D. Braatz. Maximum a posteriori estimation of energetics in silicon self-diffusion. *Proceedings of the Joint IEEE Conference on Decision and Control and European Control Conference*, IEEE Press, Piscataway, NJ, 2058-2063, 2005.

71. R. D. Braatz, R. C. Alkire, and E. G. Seebauer. A multiscale systems approach to microelectronic processes. In *Proceedings of the International Conference on Chemical Process Control*, Lake Louise, Alberta, Canada, paper 55, 2006.

72. Z. K. Nagy and R. D. Braatz. Distributional uncertainty analysis of a batch crystallization process using power series and polynomial chaos expansions. In *Proceedings of the 8th IFAC Symposium on Advanced Control of Chemical Processes,* Gramado, Brazil, 655-660, 2006.

73. E. Rusli, J. H. Lee, and R. D. Braatz. Optimal distributional control of crystal size and shape. *Proceedings of the Fifth World Congress on Particle Technology*, Orlando, FL, paper 240f, 2006.

74. K. Dev, C. T. M. Kwok, R. Vaidyanathan, R. D. Braatz, and E. G. Seebauer. Controlling dopant diffusion and activation through surface chemistry. *Ion Implantation Technology – 16th International Conference on Ion Implantation Technology*, edited by K. J. Kirkby, R. M. Gwilliam, A. Smith, and D. Chivers, American Institute of Physics, New York, Vol. 866, 50-54, 2006.

75. Z. K. Nagy, M. Fujiwara, and R. D. Braatz. Optimal control of combined cooling and anti-solvent pharmaceutical crystallization. *BIWIC 2006 – 13th International Workshop on Industrial Crystallization*, P.J. Jansen, J. H. Ter Horst, and S. Jiang, editors, Delft University Press, Delft, The Netherlands, 16-23, 2006.

76. M. W. Hermanto, R. D. Braatz, and M.-S. Chiu. Run-to-run temperature control for polymorphic transformation in pharmaceutical crystallization with uncertainties. *Proceedings of the Sixth World Congress on Intelligent Control and Automation*, Dalian, China, vol. 2, 6441-6445, 2006.

77. M. W. Hermanto, R. D. Braatz, and M.-S. Chiu. A run-to-run control strategy for polymorphic transformation in pharmaceutical crystallization. *Proceedings of the IEEE International Conference on Control Applications*, Munich, Germany, 2121-2126, 2006.

78. Z. K. Nagy, M. Fujiwara, and R. D. Braatz, Recent advances in the modelling and control of cooling and antisolvent crystallization of pharmaceuticals. *Preprints of the 8th International Symposium on Dynamics and Control of Process Systems*, Cancun, Mexico, vol. 2, 29-38, 2007.

79. M. W. Hermanto, R. D. Braatz, and M.-S. Chiu. Optimal control of polymorphic transformation in batch pharmaceutical crystallization. *Proceedings of the IEEE International Conference on Control Applications*, Singapore, 146-151, 2007.

80. M. Kishida, A. N. Ford, D. W. Pack, and R. D. Braatz. Optimal control of cellular uptake in tissue engineering. *Proceedings of the American Control Conference*, Seattle, WA, 2118-2123, 2008.

81. J. Isom, S. P. Meyn, and R. D. Braatz. Piecewise linear dynamic programming for constrained POMDPs. *Proceedings of the 23rd AAAI Conference on Artificial Intelligence*, Chicago, IL, 291-297, 2008.

82. J. G. VanAntwerp and R. D. Braatz. Statistical process control laboratory exercises for all engineering disciplines. *Proceedings of the ASEE Annual Conference*, Pittsburgh, PA, paper 1675, 2008.

83. M. Kishida and R. D. Braatz. Robustness analysis of distributed parameter systems with application to the 2D reaction-diffusion equation. *Proceedings of the 19th International Symposium on Mathematical Theory of Networks and Systems*, Blacksburg, VA, paper SSRussell1.4, 2008.

84. M. Kishida and R. D. Braatz. Internal model control of infinite dimensional systems. *Proceedings of the IEEE Conference on Decision and Control*, Cancun, Mexico, 1434-1441, 2008.

85. V. R. Subramanian, V. Boovaragavan, V. Ramadesigan, K. Chen, and R. D. Braatz. Model reformulation and design of lithium-ion batteries. *Design for Energy and the Environment: Proceedings of the Seventh International Conference on Foundations of Computer-Aided Process Design*, edited by M. M. El-Halwagi and A. A. Linninger, CRC Press, Boca Raton, FL, 987-1006, 2009.

86. M. Kishida and R. D. Braatz. Optimal spatial field control of distributed parameter systems. *Proceedings of the American Control Conference*, St. Louis, MO, 32-37, 2009.

87. M. Kishida and R. D. Braatz. RBF-based 2D optimal spatial control of the 3D reaction-convection-diffusion equation. *Proceedings of the European Control Conference*, Budapest, Hungary, Paper TuA7.4, 2009.

88. V. Ramadesigan, V. Boovaragavan, M. Arabandi, K. Chen, H. Tuskamoto, R. D. Braatz, and V. Subramanian. Parameter estimation and capacity fade analysis of lithium-ion batteries using first-principles-based efficient reformulated models. *ECS Transactions*, 19(16), 11-19, 2009.

89. J. D. Isom, R. E. LaBarre, and R. D. Braatz. Polynomial-time solution of change detection problems. *Proceedings of the Joint 48th IEEE Conference on Decision and Control and 28th Chinese Control Conference*, Shanghai, P.R. China, 4631-4636, 2009.

90. M. Kishida, D. W. Pack, and R. D. Braatz. State-constrained optimal spatial field control for controlled release in tissue engineering. *Proceedings of the American Control Conference*, Baltimore, Maryland, 4361-4366, 2010.

91. R. N. Methekar, V. Boovaragavan, M. Arabandi, V. Ramadesigan, V. R. Subramanian, F. Latinwo, and R. D. Braatz. Optimal spatial distribution of microstructure in porous electrodes for Li-ion batteries. *Proceedings of the American Control Conference*, Baltimore, Maryland, 6600-6605, 2010.

92. R. N. Methekar, V. Ramadesigan, V. R. Subramanian, and R. D. Braatz. Optimum charging profile for lithium-ion batteries to maximize energy storage and utilization. *ECS Transactions*, 25(35), 139-146, 2010.

93. M. Kishida and R. D. Braatz. Structured spatial control of the reaction-diffusion equation with parametric uncertainties. *Proceedings of the IEEE International Symposium on Computer-Aided Control System Design*, Yokohama, Japan, 1097-1102, 2010.

94. Z. K. Nagy and R. D. Braatz. Distributional uncertainty analysis using polynomial chaos expansions. *Proceedings of the IEEE International Symposium on Computer-Aided Control System Design*, Yokohama, Japan, 1103-1108, 2010.

95. A. N. Ford, D. W. Pack, and R. D. Braatz. Multi-scale modeling of PLGA microparticle drug delivery systems. *21st European Symposium on Computer-Aided Process Engineering*, edited by E. N. Pistokopoulos, M. C. Georgiadis, and A. C. Kokossis, *Computer-Aided Chemical Engineering*, Elsevier, 29:1475-1479, 2011.

96. R. N. Methekar, P. W. C. Northrop, K. Chen, R. D. Braatz, and V. R. Subramanian. Kinetic Monte Carlo simulation of surface heterogeneity in graphite electrodes for lithium-ion batteries: Passive layer formation. *Proceedings of the American Control Conference*, San Francisco, California, 1512-1517, 2011.

97. K. K. K. Kim and R. D. Braatz. Observer-based output feedback control of discrete-time Lur'e systems with sector-bounded slope-restricted nonlinearities. *Proceedings of the American Control Conference*, San Francisco, California, 2566-2571, 2011.

98. K. Chen, M. Kishida, N. Nair, M. S. Strano, and R. D. Braatz. Parameter identifiability in parallel reaction networks with application to single-walled carbon nanotubes. *Proceedings of the American Control Conference*, San Francisco, California, 2873-2878, 2011.

99. K. K. K. Kim and R. D. Braatz. Robust static and fixed-order dynamic output feedback control of discrete-time Lur'e systems. *Proceedings of the IFAC World Congress*, Milan, Italy, 227-232, 2011.

100. M. Kishida and R. D. Braatz. Robust anti-windup compensation for normal systems with application to the reaction-diffusion equation. *Proceedings of the IFAC World Congress*, Milan, Italy, 7316-7321, 2011.

101. M. Kishida, P. Rumschinski, R. Findeisen, and R. D. Braatz. Efficient polynomial-time outer bounds on state trajectories for uncertain polynomial systems using skewed structured singular values. *Proceedings of the Joint Symposium on Computer-Aided Control System Design and Systems with Uncertainty*, Denver, Colorado, 216-221, 2011.

102. K. K. K. Kim, E. Rios Patron, and R. D. Braatz. Universal approximation with error bounds for dynamic artificial neural network models: A tutorial and some new results. *Proceedings of the Joint Symposium on Computer-Aided Control System Design and Systems with Uncertainty*, Denver, Colorado, 834-839, 2011.

103. K. K. K. Kim, E. Rios Patron, and R. D. Braatz. Standard representation and stability analysis of dynamic artificial neural networks: A unified approach. *Proceedings of the Joint Symposium on Computer-Aided Control System Design and Systems with Uncertainty*, Denver, Colorado, 840-845, 2011.

104. M. Kishida and R. D. Braatz. Ellipsoid bounds on state trajectories for discrete-time systems with time-invariant and time-varying linear fractional uncertainties. *Proceedings of the 50th IEEE Conference on Decision and Control and European Control Conference*, Orlando, Florida, 5671-5676, 2011.

105. Z. W. Ulissi, M. S. Strano, and R. D. Braatz. Control of nano and microchemical systems. *Foundations of Computer-Aided Process Operations - Chemical Process Control VIII*, CACHE Corporation, Austin, TX, January 8-13, 2012, 11 pages.

106. Z. W. Ulissi, M. C. Molaro, M. S. Strano, and R. D. Braatz. Systems nanotechnology: Identification, estimation, and control of nanoscale systems. *Proceedings of the American Control Conference*, Montreal, Quebec, 1-8, June 2012.

107. K. K. K. Kim and R. D. Braatz. Probabilistic analysis and control of uncertain dynamic systems: Generalized polynomial chaos expansion approaches. *Proceedings of the American Control Conference*, Montreal, Quebec, 44-49, June 2012.

108. K. Chen, L. Goh, G. He, P. J. A. Kenis, C. F. Zukoski III, and R. D. Braatz. Identification of nucleation rates in droplet-based microfluidic systems. *Proceedings of the American Control Conference*, Montreal, Quebec, 863-868, June 2012.

109. M. Kishida and R. D. Braatz. A model-based approach for the construction of design spaces in Quality-by-Design. *Proceedings of the American Control Conference*, Montreal, Quebec, 1513-1518, June 2012.

110. S. De, P. W. C. Northrop, V. Ramadesigan, R. D. Braatz, and V. R. Subramanian. Model-based simultaneous optimization of multiple design parameters for lithium-ion batteries for maximization of energy density. *Proceedings of the American Control Conference*, Montreal, Quebec, 4275-4280, June 2012.

111. Q. L. Su, R. D. Braatz, and M.-S. Chiu. Concentration control for semi-batch pH-shift reactive crystallization of L-glutamic acid. *Proceedings of the 8th IFAC Symposium on Advanced Control of Chemical Processes*, Singapore, 228-233, July 2012.

112. K.-K. K. Kim, K. S. Cheong, K. Chen, and R. D. Braatz. Parameter estimation, analysis, and design of synthetic gene switching models: System behavior- and performance-based approaches. *Proceedings of the 8th IFAC Symposium on Advanced Control of Chemical Processes*, Singapore, 946-951, July 2012.

113. K. K. Kim and R. D. Braatz. On the robustness of interconnected or networked uncertain linear multi-agent systems. *Proceedings of the 20th International Symposium on Mathematical Theory of Networks and Systems*, Melbourne, Australia, July 9-13, 2012, Paper SE-04.4.

114. K.-K. Kim and R. D. Braatz. Convex stability conditions for interconnected or networked linear multi-agent systems. *Proceedings of the 3rd IFAC Workshop on Distributed Estimation and Control in Networked Systems*, Santa Barbara, California, September 14-15, 2012.

115. K.-K. K. Kim and R. D. Braatz. Generalized polynomial chaos expansion approaches to approximate stochastic receding horizon control with applications to probabilistic collision checking and avoidance. *Proceedings of the IEEE Conference on Control Applications*, Dubrovnik, Croatia, 350-355, October 2012.

116. H. Jang, K.-K. K. Kim, J. H. Lee, and R. D. Braatz. Fast moving horizon estimation for a distributed parameter system. *12th International Conference on Control, Automation and Systems*, Jeju Island, Korea, 533-538, October 2012.

117. K. K. K. Kim and R. D. Braatz. Continuous- and discrete-time D-stability, joint D-stability, and their applications: µ theory and diagonal stability approaches. *Proceedings of the IEEE Conference on Decision and Control*, Hawaii, 2896-2901, December 2012.

118. M. Kishida and R. D. Braatz. Inversion-based output regulation of chemotaxis using a constrained influx of chemical signaling molecules. *Proceedings of the American Control Conference*, Washington, DC, 3449-3454, June 17-19, 2013.

119. J. K. Scott, R. Findeisen, R. D. Braatz, and D. M. Raimondo. Design of active inputs for set-based fault diagnosis. *Proceedings of the American Control Conference*, Washington, DC, 3567-3572, June 17-19, 2013.

120. K.-K. K. Kim and R. D. Braatz. Convex relaxation of sequential optimal input design for a class of structured large-scale systems: Process gain estimation. *Proceedings of the American Control Conference*, Washington, DC, 3912-3917, June 17-19, 2013.

121. B. Suthar, V. Ramadesigan, P. W. C. Northrop, R. D. Braatz, S. Santhanagopalan, and V. R. Subramanian. Optimal control and state estimation of lithium-ion batteries using reformulated models. *Proceedings of the American Control Conference*, Washington, DC, 5370-5375, June 17-19, 2013.

122. K.-K. K. Kim and R. D. Braatz. Robustness analysis of uncertain linear descriptor systems: Unified approaches using gLFTs, LMIs, and µ. *Proceedings of the American Control Conference*, Washington, DC, 5877-5882, June 17-19, 2013.

123. M. Kishida and R. D. Braatz. Quality-by-Design by using the skewed spherical structured singular value. *Proceedings of the American Control Conference*, Washington, DC, 6688-6693, June 17-19, 2013.

124. K.-K. K. Kim and R. D. Braatz. Semidefinite programming relaxation of optimum active input design for fault detection and isolation: Model-based finite horizon prediction. *Proceedings of the European Control Conference*, Zürich, Switzerland, 1934-1939, July 17-19, 2013.

125. K.-K. K. Kim, D. M. Raimondo, and R. D. Braatz. Optimum input design for fault detection and diagnosis: Model-based prediction and statistical distance measures. *Proceedings of the European Control Conference*, Zürich, Switzerland, 1940-1945, July 17-19, 2013.

126. A. Mesbah and R. D. Braatz. Design of multi-objective control systems with optimal failure tolerance. *Proceedings of the European Control Conference*, Zürich, Switzerland, 2963-2968, July 17-19, 2013.

127. D. M. Raimondo, R. D. Braatz, and J. K. Scott. Active fault diagnosis using moving horizon input. *Proceedings of the European Control Conference*, Zürich, Switzerland, 3131-3136, July 17-19, 2013.

128. D. M. Raimondo, G. R. Marseglia, R. D. Braatz, and J. K. Scott. Fault-tolerant model predictive control with active fault isolation. *2nd International Conference on Control and Fault-Tolerant Systems*, Nice, France, Paper ThB1.4, October 9-11, 2013.

129. L. Zhang and R. D. Braatz. On switched MPC of a class of switched linear systems with modal dwell time. *Proceedings of the IEEE Conference on Decision and Control*, Florence, Italy, Paper TuA03.4, December 10-13, 2013.

130. A. Mesbah, M. Kishida, and R. D. Braatz. Design of multi-objective failure-tolerant control systems for infinite-dimensional systems. *Proceedings of the IEEE Conference on Decision and Control*, Florence, Italy, Paper WeB13.1, December 10-13, 2013.

131. K.-K. K. Kim and R. D. Braatz. A characterization of solutions for general copositive quadratic Lyapunov inequalities. *Proceedings of the IEEE Conference on Decision and Control*, Florence, Italy, Paper WeC05.2, December 10-13, 2013.

132. J. K. Scott, G. R. Marseglia, L. Magni, R. D. Braatz, and D. M. Raimondo. A hybrid stochastic-deterministic input design method for active fault diagnosis. *Proceedings of the IEEE Conference on Decision and Control*, Florence, Italy, Paper ThC12.4, December 10-13, 2013.

133. K.-K. K. Kim and R. D. Braatz. Computational complexity of robust control: A review of theoretical and algorithmic developments. *Proceedings of the IEEE Conference on Decision and Control*, Florence, Italy, Paper FrA14.4, December 10-13, 2013.

134. S. Streif, K.-K. K. Kim, P. Rumschinski, M. Kishida, D. E. Shen, R. Findeisen, and R. D. Braatz. Robustness analysis, prediction and estimation for uncertain biochemical networks. *Proceedings of the International Conference on Dynamics and Control of Process Systems*, Mumbai, India, Paper WeM1P.1, December 18-20, 2013.

135. R. B. Gopaluni and R. D. Braatz. State of charge estimation in Li-ion batteries using an isothermal pseudo two-dimensional model. *Proceedings of the International Conference on Dynamics and Control of Process Systems*, Mumbai, India, Paper WeA2T3.6, December 18-20, 2013.

136. H. Jang, J. H. Lee, and R. D. Braatz. Maximum-likelihood parameter estimation for detecting local concentration from a carbon nanotube-based sensor. *Proceedings of the International Conference on Dynamics and Control of Process Systems*, Mumbai, India, Paper ThM2T1.2, December 18-20, 2013.

137. S. Streif, D. Hast, R. D. Braatz, and R. Findeisen. Certifying robustness of separating inputs and outputs in active fault diagnosis for uncertain nonlinear systems. *Proceedings of the International Conference on Dynamics and Control of Process Systems*, Mumbai, India, Paper FrA3T3.6, December 18-20, 2013.

138. A. Mesbah, S. Streif, R. Findeisen, and R. D. Braatz. Stochastic nonlinear model predictive control with probabilistic constraints. *Proceedings of the American Control Conference*, Portland, Oregon, 2425-2431, 2014.

139. R. Lakerveld, B. Benyahia, P. L. Heider, H. Zhang, A. Wolfe, C. Testa, S. Ogden, D. R. Hersey, S. Mascia, J. M. B. Evans, R. D. Braatz, and P. I. Barton. The application of an automated plant-wide control strategy for a continuous pharmaceutical pilot plant. *Proceedings of the American Control Conference*, Portland, Oregon, 3524-3529, 2014.

140. K. K. K. Kim, H. Jang, B. Gopaluni, J. H. Lee, and R. D. Braatz. Sparse identification in chemical master equations for monomolecular reaction networks. *Proceedings of the American Control Conference*, Portland, Oregon, 3710-3715, 2014.

141. M. Kishida and R. D. Braatz. Non-existence conditions of local bifurcation for rational systems with structured uncertainties. *Proceedings of the American Control Conference*, Portland, Oregon, 5097-5102, 2014.

142. J. A. Paulson, D. M. Raimondo, R. Findeisen, R. D. Braatz, and S. Streif. Guaranteed active fault diagnosis for uncertain nonlinear systems. *Proceedings of the European Control Conference*, Strasbourg, France, 926-931, 2014.

143. G. R. Marseglia, J. K. Scott, L. Magni, R. D. Braatz, and D. M. Raimondo. Hybrid stochastic-deterministic approach for active fault diagnosis using scenario optimization. *Proceedings of the IFAC World Congress*, Cape Town, South Africa, 1102-1107, 2014.

144. S. Streif, F. Petzke, A. Mesbah, R. Findeisen, and R. D. Braatz. Optimal experimental design for probabilistic model discrimination using polynomial chaos. *Proceedings of the IFAC World Congress*, Cape Town, South Africa, 4103-4109, 2014.

145. A. Mesbah, S. Streif, R. Findeisen, and R. D. Braatz. Active fault diagnosis for nonlinear systems with probabilistic uncertainties. *Proceedings of the IFAC World Congress*, Cape Town, South Africa, 7079-7084, 2014.

146. H. Jang, K.-K. K. Kim, J. H. Lee, and R. D. Braatz. Regularized maximum likelihood estimation of sparse stochastic monomolecular biochemical reaction networks. *Proceedings of the IFAC World Congress*, Cape Town, South Africa, 9551-9556, 2014.

147. M. Kishida and R. D. Braatz. Volume maximization of consistent parametric uncertainty sets for linear fractional models. *Proceedings of the IEEE Conference on Decision and Control*, Los Angeles, California, 1905-1910, 2014.

148. J. A. Paulson, A. Mesbah, S. Streif, R. Findeisen, and R. D. Braatz. Fast stochastic model predictive control of high-dimensional systems. *Proceedings of the IEEE Conference on Decision and Control*, Los Angeles, California, 2802-2809, 2014.

149. L. Zhou, X. Zhu, and R. D. Braatz. Controlled seeding from multiple micromixers for tailoring the product size distribution in a semi-continuous crystallizer design. *Proceedings of the American Control Conference*, accepted January 17, 2015.

150. A. Mesbah, J. A. Paulson, R. Lakerveld, and R. D. Braatz. Plant-wide model predictive control of a continuous pharmaceutical pilot plant. *Proceedings of the American Control Conference*, accepted January 17, 2015.

151. M. Torchio, N. A. Wolff, D. M. Raimondo, L. Magni, U. Krewer, R. B. Gopaluni, J. A. Paulson, and R. D. Braatz. Real-time model predictive control for the optimal charging of a Li-ion battery. *Proceedings of the American Control Conference*, 4536-4541, 2015.

152. B. Suthar, D. Sonawane, R. D. Braatz, and V. R. Subramanian. Optimal low temperature charging of lithium-ion battery. *Proceedings of the International Symposium on Advanced Control of Chemical Processes*, Whistler, British Columbia, Canada, 1217-1222, 2015.

153. L. Foguth, J. Paulson, R. D. Braatz, and D. M. Raimondo. Fast robust model predictive control of high-dimensional systems. *Proceedings of the European Control Conference*, Paper ThB13.4, in press.

154. Kristen Severson, Paphonwit Chaiwatanodom, and Richard D. Braatz. Perspectives on process monitoring of industrial systems. *Proceedings of the 9th IFAC Symposium on Fault Detection, Supervision, and Safety for Technical Processes*, in press (invited).

155. Joel A. Paulson, Eranda Harinath, Lucas C. Foguth, and R. D. Braatz. Nonlinear model predictive control for systems with probabilistic time-invariant uncertainties. *Proceedings of the 5th IFAC Conference on Nonlinear Model Predictive Control*, Seville, Spain, 16-25, 2015.

156. Amos E. Lu, Joel A. Paulson, Nicholas J. Mozdzierz, Alan Stockdale, Ashlee N. Ford Versypt, Kerry R. Love, J. Christopher Love, and Richard D. Braatz. Control systems technology in the advanced manufacturing of biologic drugs. *Proceedings of the IEEE Multi-conference on Systems and Control*, in press.

157. Zhilong Zhu, You Peng, T. Alan Hatton, Kamal Samrane, Allan S. Myerson, and Richard D. Braatz, "Crystallization of calcium sulphate during phosphoric acid production: modeling particle shape and size distribution," *Procedia Engineering*, in press.

G. Editorial Columns

1. R. D. Braatz and Oscar D. Crisalle. Special issue: Chemical process control. *Int. J. of Robust & Nonlinear Control*, 17:1161-1162, 2007.

2. R. D. Braatz. The efficiency of the Power of One (or Zero). *IEEE Control Systems*, 32(1):6-7, 2012.
3. R. D. Braatz. Control problems of our times: Health care and energy efficiency. *IEEE Control Systems*, 32(1):8-9, 2012.
4. R. D. Braatz. The rise and fall of popular control problems. *IEEE Control Systems*, 32(2): 6-7, 2012.
5. R. D. Braatz. Control of the small. *IEEE Control Systems*, 32(2):8-9, 2012.
6. R. D. Braatz. Feedback ⊂ control. *IEEE Control Systems*, 32(3):6-7, 2012.
7. R. D. Braatz. Control at a distance: Magnetic targeting of drugs. *IEEE Control Systems Magazine*, 32(3):8-9, 2012.
8. R. D. Braatz. On precision robotics and a world-class control engineer. *IEEE Control Systems*, 32(4):6-7, 2012.
9. R. D. Braatz. Vehicle control. *IEEE Control Systems*, 32(4): 8-9, 2012.
10. R. D. Braatz. Control engineering and the birth of aviation. *IEEE Control Systems*, 32(5):6-7, 2012.
11. R. D. Braatz. Unmanned aerial vehicles. *IEEE Control Systems*, 32(5):8-9, 2012.
12. R. D. Braatz. On internal stability and unstable pole-zero cancellations. *IEEE Control Systems*, 32(5):15-16, 2012.
13. R. D. Braatz. Chasing impact factors, or making an impact on technology? *IEEE Control Systems*, 32(6):6-7, 2012.
14. R.D. Braatz. Feedback control in art, adaptation, and canals. *IEEE Control Systems*, 32(6):8-9, 2012.
15. R. D. Braatz. Guide for prospective authors for IEEE Control Systems Magazine. *IEEE Control Systems*, 33(1):6-7, 2013.
16. R. D. Braatz. Control of fluids. *IEEE Control Systems*, 33(1):8-9, 2013.
17. R. D. Braatz. The management of social networks. *IEEE Control Systems*, 33(2):6-7, 2013.
18. R. D. Braatz. Uncertainties and nonlinearities. *IEEE Control Systems*, 33(2):8-9, 2013.
19. R. D. Braatz. How much mathematics does a control engineer need to know? *IEEE Control Systems*, 33(2):19+, 2013.
20. R. D. Braatz. Control science or control engineering? *IEEE Control Systems*, 33(3):6-7, 2013.
21. R. D. Braatz. Estimation and uncertainties. *IEEE Control Systems*, 33(3):8-9, 2013.
22. R. D. Braatz. Teaching mathematics to control engineers. *IEEE Control Systems*, 33(3):66-67, 2013.
23. R. D. Braatz. The first Nobel Prize in control engineering. *IEEE Control Systems*, 33(4):6-7, 2013.
24. R. D. Braatz. Control education. *IEEE Control Systems*, 33(4):8-10, 2013.
25. R. D. Braatz. Commemorating Norbert Wiener's 120th anniversary. *IEEE Control Systems*, 33(4):61, 2013.
26. R. D. Braatz. The "Nobel Prize in Engineering" awarded for the design of a feedback control system. *IEEE Control Systems*, 33(5):6-7, 2013.
27. R. D. Braatz. Sampling. *IEEE Control Systems*, 33(5):8-10, 2013.
28. R. D. Braatz. A call for high quality perspectives papers. *IEEE Control Systems*, 33(6):6, 2013.
29. R. D. Braatz. Micro and nano systems. *IEEE Control Systems*, 33(6):7-9, 2013.

30. R. D. Braatz. Norbert Wiener, his collaborators, and the definition of the Wiener number. *IEEE Control Systems*, 33(6):136-137, 2013.
31. R. D. Braatz. Control of manufacturing processes. *IEEE Control Systems*, 34(1):6, 2014.
32. R. D. Braatz. Unmanned flight. *IEEE Control Systems*, 34(1):7-9, 2014.
33. R. D. Braatz. Simon van der Meer's Nobel Prize in control engineering. *IEEE Control Systems*, 33(5):6, 2013.
34. R. D. Braatz. Hybrid electric vehicles and oscillators. *IEEE Control Systems*, 34(2):7-8, 2014.
35. R. D. Braatz. Writing papers on control theory, 34(2):75, 2014.
36. R. D. Braatz and Z. K. Nagy. 8th IFAC International Symposium on Advanced Control of Chemical Processes (ADCHEM 2012), Singapore, July 10–13, 2012. *Journal of Process Control*, 24:2-3, 2014.
37. R. D. Braatz. Do you have a control tool or a control toolbox? *IEEE Control Systems*, 34(3):6-7, 2014.
38. R. D. Braatz. Networks and precision control. *IEEE Control Systems*, 34(3):8-9, 2014.
39. R. D. Braatz. Introducing new editorial board members. *IEEE Control Systems*, 34(3):20+, 2014.
40. R. D. Braatz. Scilab textbook companions. *IEEE Control Systems*, 33(3):76, 2014.
41. R. D. Braatz. Reproducible research. *IEEE Control Systems*, 33(4):6-7, 2014.
42. R. D. Braatz. Cooperative control. *IEEE Control Systems*, 33(4):8-11, 2014.
43. R. D. Braatz. Implications of the changing research enterprise. *IEEE Control Systems*, 33(4):21+, 2014.
44. R. D. Braatz. Papers receive more citations after rejection. *IEEE Control Systems*, 33(4):22-23, 2014.
45. R. D. Braatz. Perceptions of science and engineering. *IEEE Control Systems*, 33(5):6-7, 2014.
46. R. D. Braatz. Renewable energy and optimization-based control. *IEEE Control Systems*, 33(5):8-10, 2014.
47. R. D. Braatz. IEEE Control Systems Magazine operations from 2012 to 2014. *IEEE Control Systems*, 33(6):6-7, 2014.
48. R. D. Braatz. Power networks. *IEEE Control Systems*, 33(6):8-11, 2014.
49. R. D. Braatz and J. H. Lee. Special Issue in Honor of Manfred Morari's 60th Birthday, *Comput. Chem. Eng.*, 70:1-2, 2014.
50. R. D. Braatz. ACC 2015 in Chicago. *IEEE Control Systems*, 34(1):142-149, 2015.
51. R. D. Braatz. American Control Conference 2015. IEEE Control Systems, 34(6), 2015, in press.

H. Selected Software

1. (one of 17 contributors) Manfred Morari and N. Lawrence Ricker. Model predictive control toolbox, Version 1. The MathWorks, Inc., Natick, MA, 1995-2003.
2. S. Pamidighantam, L. A. Bievenue, and R. D. Braatz. ChemViz: Chemistry visualization and computation of molecular structure, Version 2.0. University of Illinois, Urbana, 2003.
3. X. Y. Woo, R. B. H. Tan, and R. D. Braatz. Simulation of mixing effects in crystallization processes using a coupled CFD-PDF-PBE approach, Version 1.0, University of Illinois, Urbana, 2007.

4. R. Gunawan, I. Fusman, and R. D. Braatz. ParticleSolver: Simulation of particles undergoing nucleation, growth, and aggregation, Version 2.0. University of Illinois, Urbana, 2008.
5. L. Goh, J. Pazmino, E. Rusli, J. A. Washington, S. Im, M. Fujiwara, and R. D. Braatz. Interactive educational materials for teaching "Nano" concepts, Version 1.5. University of Illinois, Urbana, 2008. Available with additional software at the "Nano Lessons and Courses" website of the Nanotechnology Center for Learning and Teaching, Northwestern, http://community.nsee.us/index.php?option=com_content&view=category&id=71:nano-lessons-and-courses-&Itemid=74&layout=default

I. Meeting Abstracts

1. R. D. Braatz, M. Morari, and J. H. Lee. Necessary, and sufficient loop-shaping bounds for robust performance. *AIChE Annual Meeting*, Los Angeles, CA, 1991. Paper 154d.
2. J. H. Lee, R. D. Braatz, M. Morari, and A. Packard. Screening tools for robust control structure selection. *AIChE Annual Meeting*, Los Angeles, CA, 1991. Paper 152p.
3. R. D. Braatz. Identification and control of coating processes. *4th Nordic Workshop on Process Control*, Chalmers Technical University, Gothenburg, Sweden, August, 1992.
4. R. D. Braatz, M. Morari, and S. Skogestad. Advances in robust loopshaping. *AIChE Annual Meeting*, Miami Beach, FL, 1992. Paper 127a.
5. R. D. Braatz, K. J. Åström, and M. Morari. Robust automatic tuning of PID controllers. *AIChE Annual Meeting*, St. Louis, MO, 1993. Paper 149c.
6. R. D. Braatz, F. J. Doyle III, M. A. Henson, B. A. Ogunnaike, M. Pottmann, and J. S. Schwaber. Novel process technologies from biological inspiration. *Workshop on Novel Control Techniques from Biological Inspiration, Conference on Neural Information Processing Systems*, Vale, CO, December, 1994. Paper 149c.
7. R. D. Braatz, B. A. Ogunnaike, and J. S. Schwaber. Failure tolerant globally optimal linear control via parallel design. *AIChE Annual Meeting*, San Francisco, CA, 1994. Paper 232b.
8. R. D. Braatz. Control of sheet and film processes. *Third SIAM Conference on Control and Its Applications*, St. Louis, MO, April 27-29, 1995.
9. R. D. Braatz and G. Mijares. Control relevant identification and estimation. *AIChE Annual Meeting*, Miami Beach, FL, 1995. Paper 183a.
10. R. D. Braatz and J. H. Lee. Physical consistency in control structure selection and the integration of design and control. *AIChE Spring National Meeting*, New Orleans, LA, 1996. Paper 79d.
11. R. D. Braatz and J. G. VanAntwerp. Model predictive control of large scale processes. *AIChE Spring National Meeting*, New Orleans, LA, February 27, 1996. Paper 81c.
12. R. D. Braatz. Robustness margin computation for large scale systems. *AIChE Annual Meeting*, Chicago, IL, 1996. Paper 141d.
13. A. P. Featherstone and R. D. Braatz. Control relevant identification of structured large scale systems. *Second Midwest Process Control Workshop*, University of Michigan, Ann Arbor, MI, April 27, 1996.
14. E. L. Russell and R. D. Braatz. Multidimensional realization of large scale uncertain systems. *Second Midwest Process Control Workshop*, University of Michigan, Ann Arbor, MI, April 27, 1996.

15. J. G. VanAntwerp and R. D. Braatz. Model predictive control of large scale paper machines. *Second Midwest Process Control Workshop*, University of Michigan, Ann Arbor, MI, April 27, 1996.
16. E. L. Russell and R. D. Braatz. Analysis of large scale systems with model uncertainty, actuator and state constraints, and time delays. *AIChE Annual Meeting*, Chicago, IL, November 1996. Paper 45a.
17. E. L. Russell and R. D. Braatz. The average-case identifiability of large scale systems. *AIChE Annual Meeting*, Los Angeles, CA, 1997. Paper 215a.
18. R. D. Braatz, M. R. Johnson, K. M. Schmitt, Ian G. Horn, N. Perna, and J. Wentz. Process control laboratory education using a graphical operator interface constructed with Data Translation data acquisition software. *ASEE Summer School for Chemical Engineering Faculty*, Snowbird, UT, 1997.
19. A. P. Featherstone and R. D. Braatz. Design of experiments for the robust identification of sheet and film processes. *AIChE Annual Meeting*, Los Angeles, CA, 1997. Paper 192c.
20. E. Rios and R. D. Braatz. Stability analysis of generic nonlinear systems. *AIChE Annual Meeting*, Los Angeles, CA, 1997. Paper 214g.
21. R. D. Braatz and J. Alameda. Chemical engineering workbench. *NCSA Campus Day*, University of Illinois, Urbana, IL, May, 1998.
22. E. Rios-Patron and R. D. Braatz. Performance analysis and optimization-based control of nonlinear systems with general dynamics. *AIChE Annual Meeting*, Miami Beach, FL, 1998. Paper 227g.
23. R. D. Braatz. A general framework for the analysis and control of nonlinear dynamical systems modelled by dynamic ANNs. *ANNCBT/IWGGEC Workshop on Adaptive Computation*, Beckman Institute, University of Illinois, Urbana, IL, 1999.
24. R. D. Braatz. Interaction between design and control for large scale systems. *AIChE Annual Meeting*, Dallas, TX, 1999. Paper 222b.
25. L. H. Chiang, E. L. Russell, and R. D. Braatz. Fault detection using canonical variate analysis and dynamic PCA. *AIChE Annual Meeting*, Dallas, TX, 1999. Paper 224f.
26. D. L. Ma, S. H. Chung, and R. D. Braatz. Worst-case analysis of batch and semibatch control trajectories. *AIChE Annual Meeting*, Dallas, TX, 1999. Paper 215a.
27. D. L. Ma, T. Togkalidou, and R. D. Braatz. Multidimensional crystal growth from solution. *AIChE Annual Meeting*, Dallas, TX, 1999. Paper 132c.
28. J. G. VanAntwerp and R. D. Braatz. Robust control of large scale paper machines. *AIChE Annual Meeting*, Dallas, TX, 1999. Paper 276h.
29. R. Gunawan, E. L. Russell, and R. D. Braatz. Model reduction of large scale uncertain systems. *AIChE Annual Meeting*, Dallas, TX, 1999. Paper 225i.
30. M. Y. Jung, R. Gunawan, R. D. Braatz, and E. G. Seebauer. Detailed modeling of transient enhanced diffusion in implanted Si. *AIChE Annual Meeting*, Dallas, TX, 1999. Paper 189d.
31. M. Y. Jung, R. Gunawan, R. D. Braatz, and E. G. Seebauer. Fast-ramp annealing for reducing implant-induced transient enhanced diffusion. *American Vacuum Society Meeting, 47th International Symposium: Vacuum, Thin Films, Surfaces/Interfaces, and Processing*, Boston, 2000. Paper Ms-ThM3.
32. M. Y. Jung, R. Gunawan, R. D. Braatz, and E. G. Seebauer. Fast-ramp annealing for reducing implant-induced transient enhanced diffusion. *AIChE Annual Meeting*, Los Angeles, CA, 2000. Paper 217h.

33. R. D. Braatz, D. L. Ma, T. Togkalidou, M. Fujiwara, S. D. Patel, and D. K. Tafti. Modeling and control of multidimensional crystallization. *AIChE Annual Meeting*, Los Angeles, CA, 2000. Paper 253h.

34. M. Y. Jung, R. Gunawan, R. D. Braatz, and E. G. Seebauer. Surface Fermi level pinning: an electrical "valve" in transient enhanced diffusion. *Materials Research Society Spring Meeting*, San Francisco, CA, 2001. Paper J4.21.

35. D. L. Ma, D. Tafti, and R. D. Braatz. Compartmental modeling of multidimensional crystallization. *International Conference on Materials for Advanced Technologies*, Symposium D: Crystallization and Interfacial Processes, Singapore, 2001. Paper D203-018.

36. R. Gunawan, D. L. Ma, M. Fujiwara, and R. D. Braatz. Identification of kinetic parameters in a multidimensional crystallization process. *International Conference on Materials for Advanced Technologies*, Symposium D: Crystallization and Interfacial Processes, Singapore, 2001. Paper 303-010.

37. R. D. Braatz, M. Fujiwara, D. L. Ma, T. Togkalidou, and D. K. Tafti. Simulation and new sensor technologies for industrial crystallization: A review and some new results. *International Conference on Materials for Advanced Technologies*, Symposium D: Crystallization and Interfacial Processes, Singapore, 2001. Paper DI6-002.

38. M. Fujiwara, J. C. Pirkle Jr., T. Togkalidou, D. L. Ma, R. Gunawan, and R. D. Braatz. A holistic approach to materials process design. *International Conference on Materials for Advanced Technologies*, Symposium H: Materials Science and Engineering Education in New Millenium, Singapore, 2001. Paper H4-04-IN.

39. L. H. Chiang and R. D. Braatz. Causal map for process monitoring. *The Gordon Conference on Statistics in Chemistry and Chemical Engineering*, Williams College, Williamstown, MA, July 22-27, 2001.

40. T. O. Drews, J. Alameda, R. D. Braatz, and R. C. Alkire. Parameter estimation and multi-scale simulations of surface roughness evolution during copper electrodeposition. *Symposium on Fundamental Aspects of Electrodeposition and Dissolution*, *Electrochemical Society Meeting*, San Francisco, California, 2001.

41. L. H. Chiang and R. D. Braatz. Process monitoring using causal map and multivariate statistics. *AIChE Annual Meeting*, Reno, NV, 2001. Paper 282e.

42. T. O. Drews, E. Rusli, E. G. Webb, J. Alameda, R. D. Braatz, and R. C. Alkire. A multi-scale model of copper electrodeposition in on-chip interconnects: Nonlinear systems analysis for linked multi-scale codes. *AIChE Annual Meeting*, Reno, NV, 2001. Paper 298e.

43. D. L. Ma, D. K. Tafti, and R. D. Braatz. Compartmental modeling of multidimensional crystallization. *AIChE Annual Meeting*, Reno, NV, 2001. Paper 287b.

44. T. O. Drews, J. Alameda, R. D. Braatz, and R. C. Alkire. Integration of linked continuum-mesoscale codes with experimental data: The role of additives during copper electrodeposition. *AIChE Annual Meeting*, Reno, NV, 2001. Paper 127e.

45. D. L. Ma, P. S. Chow, M. Fujiwara, and R. D. Braatz. Identification of crystallization kinetics for acetaminophen via laser backscattering and ATR-FTIR spectroscopy. *223rd American Chemical Society National Meeting*, *Abstracts of Papers of the American Chemical Society*, 223:231-IEC Part 1, April 7, 2002.

46. R. Braatz, S. Pamidighantam, R. Lewis, and L. Bievenue. ChemViz: Using computation and scientific visualization to teach quantum chemistry concepts. *Teaching with Instructional Technologies*, Urbana, IL, 2002.

47. L. Bievenue, R. Lewis, S. Pamidighantam, and R. Braatz. Using computation and scientific visualization to teach quantum chemistry concepts. *Alliance All-Hands Meeting*, Urbana, IL, 2002.

48. T. O. Drews, S. Krishnan, J. Alameda, D. Gannon, R. D. Braatz, and R. C. Alkire. Multiscale simulations of copper electrodeposition onto a resistive substrate. *Gordon Conference on Electrodeposition*, Colby-Sawyer College, New London, NH, August 11-16, 2002.

49. T. O. Drews, S. Krishnan, J. Alameda, D. Gannon, R. D. Braatz, and R. C. Alkire. Multiscale simulations of copper electrodeposition onto a resistive substrate. *202nd Meeting of the Electrochemical Society*, Salt Lake City, UT, October 20-25, 2002. Paper 413.

50. M. Y. L. Jung, R. Gunawan, R. D. Braatz, and E. G. Seebauer. Mathematical approaches to optimal control of transient enhanced diffusion. *American Vacuum Society 49th International Symposium*, Denver, CO, November 4, 2002. Paper MS-MoA4.

51. K. Dev, M. Y. L. Jung, R. Gunawan, R. D. Braatz, and E. G. Seebauer. Measurement of Fermi level pinning kinetics at Si-SiO_2 interfaces: Implications for CMOS transistor manufacture. *AVS 49th International Symposium*, Denver, CO, November 5, 2002. Paper EL+SC-TuM10.

52. T. O. Drews, S. Krishnan, J. Alameda, D. Gannon, R. D. Braatz, and R. C. Alkire. Multiscale simulations of copper electrodeposition onto a resistive substrate. *AIChE Annual Meeting*, Indiana, IN, November 2002. Paper 196h.

53. R. Gunawan, M. Y. L. Jung, E. G. Seebauer, and R. D. Braatz. Maximum a posteriori estimation of transient enhanced diffusion kinetics. *AIChE Annual Meeting*, Indiana, IN, November 2002. Paper 256d.

54. R. Gunawan, M. Y. L. Jung, E. G. Seebauer, and R. D. Braatz. Optimal control of transient enhanced diffusion. *AIChE Annual Meeting*, Indiana, IN, November 2002. Paper 261c.

55. Z. K. Nagy and R. D. Braatz. Robust EKF-based nonlinear model predictive control of batch processes. *AIChE Annual Meeting*, Indiana, IN, November 2002. Paper 243b.

56. Z. K. Nagy, M. Fujiwara, and R. D. Braatz. Theoretical and experimental comparison of temperature-, concentration-, and growth rate-controlled batch crystallization. *AIChE Annual Meeting*, Indiana, IN, November 2002. Paper 149c.

57. M. Y. Jung, R. Gunawan, R. D. Braatz, and E. G. Seebauer. Systems analysis applied to modeling transient enhanced diffusion in transistor manufacture. *AIChE Annual Meeting*, Indiana, IN, November 2002. Paper 196e.

58. E. J. Hukkanen, T. O. Drews, R. C. Alkire, and R. D. Braatz. Parameter sensitivity analysis for stochastic simulation codes, with application to a multiscale simulation code. *AIChE Annual Meeting*, Indiana, IN, November 2002. Paper 279e.

59. J. Alameda, R. C. Alkire, R. D. Braatz, R. Bramley, T. O. Drews, D. Gannon, M. Gower, S. Hampton, B. Jewett, S. Krishnan, M. Kamrunahar, H. Rehn, and R. Wilhelmson. The Alliance Science Portal. *AIChE Annual Meeting*, Indiana, IN, November 2002. Paper 250a.

60. E. J. Hukkanen and R. D. Braatz. Measurement and control of suspension polymerization using in situ laser backscattering and video microscopy. *AIChE Annual Meeting*, Indiana, IN, November 2002. Paper 149f.

61. R. Kruse, L. Page, and R. D. Braatz. Computer-based visualization in secondary chemistry education. *Supercomputing2002*, Baltimore, MD, November 16, 2002.

62. T. O. Drews, E. Hukkanen, R. D. Braatz, and R. C. Alkire. Parameter sensitivity analysis of stochastic simulation codes. *SIAM Conference on Computational Science and Engineering*, San Diego, CA, February 10-13, 2003.

63. R. Braatz, L. Bievenue, and J. Moran. ChemViz. *Symposium on Molecular Modeling and Visualization Tools in Science Education*, *National Association of Researchers in Science Teaching (NARST) Annual Meeting*, Philadelphia, PA, March 23, 2003.

64. S. Pamidighantam, L. Bievenue, and R. D. Braatz. Visualizing chemistry for high school and undergraduate education. *Alliance All-Hands Meeting*, Urbana, IL, April 30, 2003.

65. R. C. Alkire, R. D. Braatz, L. Petzold, J. Alameda, D. Gannon, A. Rossi, and S. Hampton. Multiscale grid-based computational science and engineering. *Alliance All-Hands Meeting*, Urbana, IL, April 30, 2003.

66. T. O. Drews, R. C. Alkire, and R. D. Braatz. Multiscale simulations of nanofabricated structures: Application to copper electrodeposition for microelectronics applications in electronic devices. *Nanotechnology Industry Workshop*, Center for Nanoscale Science and Technology, Urbana, IL, May 9, 2003.

67. E. Rusli, T. O. Drews, R. D. Braatz, and R. C. Alkire. Nonlinear feedback control of a stochastic multiscale code for simulating thin films and trenches. *Nanotechnology Industry Workshop*, Center for Nanoscale Science and Technology, Urbana, IL, May 9, 2003.

68. R. Gunawan, M. Y. L. Jung, R. D. Braatz, and E. G. Seebauer. Nanosystems engineering applied to transient-enhanced diffusion modeling. *Nanotechnology Industry Workshop*, Center for Nanoscale Science and Technology, Urbana, IL, May 9, 2003.

69. T. O. Drews, R. D. Braatz, and R. C. Alkire. Multi-scale simulations of nanofabricated structures: Application to copper electrodeposition for microelectronics applications. *204th Meeting of the Electrochemical Society*, Orlando, FL, October 12-17, 2003. Session A1. Abstract 41.

70. T. O. Drews, J. Erlebacher, R. D. Braatz, P. C. Searson, and R. C. Alkire. Atomic-scale kinetic Monte Carlo simulations of copper nucleation: Investigation of attachment-limited rate laws. *204th Meeting of the Electrochemical Society*, Orlando, FL, October 12-17, 2003. Session J1.

71. T. O. Drews, F. Xue, X. Li, H. Deligianni, P. Vereecken, E. Cooper, P. Andricacos, R. D. Braatz, and R. C. Alkire. Parameter estimation of a copper electrodeposition additive mechanism using data obtained from a D-optimal experimental design. *204th Meeting of the Electrochemical Society*, Orlando, FL, October 12-17, 2003. Abstract 698.

72. R. Gunawan, I. Fusman, and R. D. Braatz. High resolution algorithms for multidimensional population balance equations with nucleation and size-dependent growth. *AIChE Annual Meeting*, San Francisco, CA, November 16-21, 2003. Paper 453a.

73. R. D. Braatz, R. C. Alkire, E. G. Seebauer, T. O. Drews, R. Gunawan, M. Y. L. Jung, and E. Rusli. Multiscale systems engineering with applications to microelectronics. *AIChE Annual Meeting*, San Francisco, CA, November 16-21, 2003. Paper 434a.

74. E. Rusli, T. O. Drews, X. Li, R. C. Alkire, and R. D. Braatz. Nonlinear feedforward-feedback control of a coupled mesoscale-continuum simulation code. *AIChE Annual Meeting*, San Francisco, CA, November 16-21, 2003. Paper 439c.

75. T. O. Drews, R. D. Braatz, and R. C. Alkire. Multi-scale simulations of nanofabricated structures: Application to copper electrodeposition for microelectronics applications. *AIChE Annual Meeting*, San Francisco, CA, November 16-21, 2003. Paper 339a.

76. T. O. Drews, X. Li, F. Xue, H. Deligianni, P. Vereecken, E. Cooper, P. Andricacos, R. D. Braatz, and R. C. Alkire. Parameter estimation of a copper electrodeposition additive mechanism using a multi-scale simulation code. *AIChE Annual Meeting*, San Francisco, CA, November 16-21, 2003. Paper 439l.

77. E. J. Hukkanen and R. D. Braatz. Modeling and control of suspension polymerization: Theory and experiments. *AIChE Annual Meeting*, San Francisco, CA, November 16-21, 2003. Paper 339e.

78. E. J. Hukkanen and R. D. Braatz. An HPC approach to the simulation and parameter estimation of polymerization reactions. *AIChE Annual Meeting*, San Francisco, CA, November 16-21, 2003. Paper 439ac.

79. E. J. Hukkanen and R. D. Braatz. Nonlinear control of suspension polymerization: Theory and experiments. *AIChE Annual Meeting*, San Francisco, CA, November 16-21, 2003. Paper 440e.

80. E. Rusli, T. O. Drews, R. C. Alkire, and R. D. Braatz. Understanding the numerical stability and accuracy of dynamically coupled multiscale simulation codes: A control systems approach. *AIChE Annual Meeting*, San Francisco, CA, November 16-21, 2003. Paper 444f.

81. J. Moran, R. Braatz, M. Fujiwara, D. Chapman, and L. Bievenue. ChemViz: Chemistry visualization and computation of molecular structure. *Symposium on Approaches to Integrating Science Research and Science Education Using Molecular Models*, *American Association for the Advancement of Science Annual Meeting*, Seattle, WA, February 16, 2004.

82. E. Rusli, T. O. Drews, X. Li, R. C. Alkire, and R. D. Braatz. Perspectives on the design and control of multiscale systems. *Nanotechnology in Homeland Security Workshop*, Center for Nanoscale Science and Technology, Urbana, IL, May 6-7, 2004.

83. X. Woo, R. D. Braatz, and R. B. H. Tan. A study of mixing effects in antisolvent crystallization by coupled CFD and population balance modeling. *5th International Symposium on Mixing in Industrial Processes*, Seville, Spain, June 1-4, 2004.

84. E. Rusli**,** T. O. Drews, and R. D. Braatz. Systems analysis and design of dynamically coupled multiscale reactor simulation codes. *18th International Symposium on Chemical Reaction Engineering*, Chicago, Illinois, June 6-9, 2004.

85. R. D. Braatz, R. C. Alkire, E. Rusli, and T. O. Drews. Multiscale systems engineering with applications to chemical reaction processes. *18th International Symposium on Chemical Reaction Engineering*, Chicago, Illinois, June 6-9, 2004.

86. T. O. Drews, R. D. Braatz, and R. C. Alkire, Kinetic Monte Carlo simulations of the growth of nanoscale metal clusters by electrodeposition. *Prairie Chapter of the American Vacuum Society Annual Meeting*, Urbana, IL, June 14, 2004.

87. E. Rusli, T. O. Drews, X. Li, R. C. Alkire, and R. D. Braatz. Multiscale systems engineering with applications to chemical reaction processes, *Prairie Chapter of the American Vacuum Society Annual Meeting*, Urbana, IL, June 14, 2004.

88. X. Woo, R. B. H. Tan, and R. D. Braatz. Coupled CFD-PBE simulation of mixing effects in antisolvent pharmaceutical crystallization. *AIChE Annual Meeting*, Austin, TX, November 7-12, 2004. Paper 230a.

89. J. C. Pirkle, Jr., M. Fujiwara, and R. D. Braatz. Dynamics and parameter sensitivity analysis for a two-phase microstructural model for dynamic blown-film extrusion: Theory and experiments. *AIChE Annual Meeting*, Austin, TX, November 7-12, 2004. Paper 340e.

90. K. Dev, C. T. M. Kwok, R. D. Braatz, and E. G. Seebauer. New mechanisms for controlling transistor junction formation through surface chemistry. *AIChE Annual Meeting*, Austin, TX, November 7-12, 2004. Paper 366e.

91. E. Rusli, M. Fujiwara, J. H. Lee, and R. D. Braatz. Run-to-run control of the crystal size distribution during solution crystallization using laser backscattering and ATR-FTIR spectroscopy. *AIChE Annual Meeting*, Austin, TX, November 7-12, 2004. Paper 411a.

92. E. J. Hukkanen and R. D. Braatz. Robust distribution control of suspension polymerization. *AIChE Annual Meeting*, Austin, TX, November 7-12, 2004. Paper 418e.

93. J. Isom and R. D. Braatz. Economic design of stateless control charts for deteriorating systems, *AIChE Annual Meeting*, Austin, TX, November 7-12, 2004. Paper 429e.

94. Y. He, J. R. Gray, R. D. Braatz, and R. C. Alkire. Modulized coupled simulation of localized pit initiation in stainless steel. *AIChE Annual Meeting*, Austin, TX, November 7-12, 2004. Paper 435b.

95. C. T. M. Kwok, K. Dev, E. G. Seebauer, and R. D. Braatz. Optimal model-based experimental design and Bayesian parameter estimation of the surface annihilation probability in transient enhanced diffusion. *AIChE Annual Meeting*, Austin, TX, November 7-12, 2004. Paper 436b.

96. R. Vaidyanathan, K. Dev, M. Y. L. Jung, C. T. M. Kwok, R. D. Braatz, and E. G. Seebauer. Defect engineering in silicon at the nanoscale through surface chemistry. *Nanotechnology Workshop 2005*, Center for Nanoscale Science and Technology, Urbana, IL, May 5-6, 2005.

97. J. Isom and R. D. Braatz. Economic design of control charts for deteriorating systems. *Gordon Conference on Statistics in Chemistry and Chemical Engineering*, Mount Holyoke College, South Hadley, MA, July 17-22, 2005.

98. **Opening talk:** R. D. Braatz. Computational aspects of multiscale simulations of electrochemical systems. *Symposium on Multiscale Simulations of Electrochemical Systems - Computational Aspects*, *208th Meeting of the Electrochemical Society*, Los Angeles, CA, October 16-21, 2005. Abstract 1086.

99. R. Vaidyanathan, K. Dev, R. D. Braatz, and E. G. Seebauer. Control of defect concentrations in silicon through surface chemistry. *AIChE Annual Meeting*, Cincinnati, OH, November 2005. Paper 135a.

100. K. S. Cheong, S. Farooq, and R. D. Braatz. A model of the Darwinian evolution of cancer progression. *AIChE Annual Meeting*, Cincinnati, OH, November 2005. Paper 173c.

101. X. Y. Woo, R. B. H. Tan, and R. D. Braatz. Design of industrial-scale crystallizers to include the effects of macromixing and micromixing on the crystal size distribution. *AIChE Annual Meeting*, Cincinnati, OH, November 2005. Paper 243g.

102. M. Fujiwara, T. J. Wubben, X. Y. Woo, and R. D. Braatz. Direct design of batch recipes and concentration control in antisolvent crystallization. *AIChE Annual Meeting*, Cincinnati, OH, November 2005. Paper 394g.

103. M. Karulkar, F. Xue, T. O. Drews, Y. He, X. Li, E. Rusli, R. C. Alkire, R. D. Braatz. Multiscale systems engineering with application to copper electrodeposition. *AIChE Annual Meeting*, Cincinnati, OH, November 2005. Paper 565e.

104. X. Y. Woo, R. B. H. Tan, and R. D. Braatz. Simulation of mixing effects in antisolvent crystallization using a coupled CFD-micromixing-PBE approach. *AIChE Annual Meeting*, Cincinnati, OH, November 2005. Paper 529b.

105. E. Seebauer, K. Dev, C. T. M. Kwok, and R. D. Braatz. Controlling ultrashallow junction formation through surface chemistry. *AIChE Annual Meeting*, Cincinnati, OH, November 2005. Paper 586a.

106. A. N. Ford and R. D. Braatz. Multiscale systems engineering in micro-, nano-, and biotechnology. *CNST Nanotechnology Workshop*, Urbana, IL, May 4, 2006.

107. R. D. Braatz, M. Fujiwara, N. C. S. Kee, X. Y. Woo, E. Rusli, and R. B. H. Tan. Research on the controlled crystallization of pharmaceuticals. *27th Annual General Meeting of the International Fine Particle Research Institute*, Santa Barbara, CA, June 28, 2006 (invited).

108. J. Isom and R. D. Braatz, Design of maintenance policies for the infrastructure for mitigating disasters. *Conference on Dynamics of Disasters*, Athens, Greece, October 5-7, 2006.

109. N. C. S. Kee, R. B. H. Tan, and R. D. Braatz. Selective crystallization of the metastable alpha form of L-glutamic acid through concentration feedback control. *AIChE Annual Meeting*, San Francisco, November 2006. Paper 684b.

110. X. Y. Woo, R. B. H. Tan, and R. D. Braatz. Modeling and simulation of impinging jet crystallization. *AIChE Annual Meeting*, San Francisco, November 2006. Paper 57a.

111. X. Y. Woo, R. B. H. Tan, and R. D. Braatz. A systematic design approach to tailor crystal size distribution for mixing-sensitive crystallization processes. *AIChE Annual Meeting*, San Francisco, November 2006. Paper 457g.

112. K. S. Cheong, S. Farooq, and R. D. Braatz. Modeling cellular immortality in cancer cells. *AIChE Annual Meeting*, San Francisco, November 2006. Paper 442l.

113. L. Goh, J. Pazmino, E. Rusli, J. A. Washington, S. Im, M. Fujiwara, and R. D. Braatz. Interactive educational materials for teaching "nano" concepts, *Workshop on Nanoscale Science and Engineering Education*, Arlington, Virginia, January 11-12, 2007.

114. V. Maynard, M. Hsu, J. Krajcik, R. Braatz, L. M. Goh, K. Chen, and R. DeWald. Introduction to the nanoscale, *Workshop on Nanoscale Science and Engineering Education*, Arlington, Virginia, January 11-12, 2007.

115. L. Goh, J. Pazmino, J. A. Washington, M. Fujiwara, and R. D. Braatz. The chemistry of metal and semiconductor nanoparticles. *American Chemical Society 233rd National Meeting and Exposition*, Chicago, IL, March 25-29, 2007. Abstract 1668.

116. X.-H. Li, R. D. Braatz and R. Alkire. Numerical simulation of superfilling during copper electrodeposition in small trenches. *211th Electrochemical Society Meeting*, Chicago, IL, May 8, 2007, Abstract 837.

117. M. Karulkar, R. C. Alkire and R. D. Braatz. Simulation of copper nucleation on gold: investigating the effects of additives. *211th Electrochemical Society Meeting*, Chicago, IL, May 8, 2007, Abstract 945.

118. A. N. Ford, D. W. Pack, and R. D. Braatz. Modeling autocatalytic controlled-release drug delivery from PLGA microspheres. *AIChE Annual Meeting*, Salt Lake City, November 2007. Paper 516ap.

119. M. Kishida, A. N. Ford, D. W. Pack, and R. D. Braatz. Optimal control of cellular uptake rate in tissue scaffolds. *AIChE Annual Meeting*, Salt Lake City, November 2007. Paper 96d.

120. L. M. Goh, K. J. Chen, G.H. He, V. Bhamidi, P. J. A. Kenis, C. F. Zukoski, and R. D. Braatz. Nucleation kinetics determination in high-throughput microfluidic systems. *AIChE Annual Meeting*, Salt Lake City, November 2007. Paper 353d.

121. N. Kee, R. B. H. Tan, and R. D. Braatz. Selective crystallization of the metastable anhydrate form in the enantiotropic pseudo-dimorph system of L-phenylalanine using feedback concentration control. *AIChE Annual Meeting*, Salt Lake City, November 2007. Paper 410c.

122. L. M. Goh and R. D. Braatz. Simulation of the solution concentration field within an evaporating hanging droplet. *AIChE Annual Meeting*, Salt Lake City, November 2007. Paper 467e.

123. K. Chen, R. Vaidyanathan, E. G. Seebauer, and R. D. Braatz. Asymptotic behavior of reaction-diffusion PDEs in dopant diffusion. *AIChE Annual Meeting*, Salt Lake City, November 2007. Paper 410c.

124. R. D. Braatz. Multiscale modeling and design. *India-American Frontiers of Engineering Symposium*, Irvine, CA, February 28-March 1, 2008 (poster).

125. R. D. Braatz and P. Dutta. Frontiers in chemical and automotive manufacturing. *India-American Frontiers of Engineering Symposium*, Irvine, CA, February 28-March 1, 2008 (introductory talk to session).

126. **Opening talk:** R. C. Alkire and R. D. Braatz. Multiscale modeling and design of electrochemical systems. *Symposium on Multiscale Simulations of Electrochemical Systems – Computational Aspects*, *213th Meeting of the Electrochemical Society*, Phoenix, Arizona, May 18-23, 2008. Abstract 878.

127. M. Karulkar, M. Willis, R. Braatz, and R. Alkire. Kinetically-limited electrodeposition of copper on gold in the presence of additives: Multi-scale phenomena during nucleation and overgrowth on a resistive strip. *213th Meeting of the Electrochemical Society*, Phoenix, Arizona, May 18-23, 2008. Abstract 879.

128. N. Nair, R. D. Braatz, and M. S. Strano. Facilitating density-based electronic-type separation of carbon nanotubes via chemical reactions: A modeling study. *236th American Chemical Society Meeting*, Philadelphia, PA, August 17-21, 2008. Abstract INOR 136.

129. N. Nair, R. D. Braatz, and M. S. Strano. Dynamics of surfactant-suspended single walled carbon nanotubes in a centrifugal field. *236th American Chemical Society Meeting*, Philadelphia, PA, August 17-21, 2008. Abstract INOR 618.

130. M. L. Rasche, K. K. Kim, D. Reid, L. M. Goh, M. Fujiwara, H.-S. Hahm, U. Ravaioli, and R. D. Braatz. Interactive software and design projects for teaching critical concepts in nanoscale science and technology. *Global NSEE Workshop*, Arlington, VA, November 13-14, 2008.

131. A. N. Ford, D. W. Pack, and R. D. Braatz. A mechanistic modeling approach to the design and evaluation of polymeric drug delivery systems. *AIChE Annual Meeting*, Philadelphia, Pennsylvania, November 2008. Paper 135a.

132. N. Nair, W. J. Kim, R. D. Braatz, and M. Strano. Dynamics of surfactant-suspended single walled carbon nanotubes in a centrifugal field. *AIChE Annual Meeting*, Philadelphia, PA, November 2008. Paper 188g.

133. M. L. Rasche and R. D. Braatz. Modeling transport processes within a high-throughput evaporation platform. *AIChE Annual Meeting*, Philadelphia, PA, November 2008. Paper 473e.

134. A. N. Ford, D. W. Pack, and R. D. Braatz. Modeling drug delivery for design of PLGA microparticles. *AIChE Annual Meeting*, Philadelphia, PA, November 2008. Paper 572h.

135. A. N. Ford, D. W. Pack, and R. D. Braatz. Multiscale modeling of polymer microsphere drug delivery. *AIChE Annual Meeting*, Philadelphia, PA, November 2008. Paper 653a.

136. M. Hermanto, K. C. Shen, R. D. Braatz, and M. S. Chiu. Modelling and simulation of the crystallization of L-glutamic acid polymorphs. *AIChE Annual Meeting*, Philadelphia, PA, November 2008. Paper 712d.

137. N. Kee, X. Y. Woo, R. B. H. Tan, and R. D. Braatz. Precise tailoring of the crystal size distribution by optimal seeding time profiles. *AIChE Annual Meeting*, Philadelphia, PA, November 2008. Paper 744e.

138. M. Kishida, A. N. Ford, D. W. Pack, and R. D. Braatz. Optimal control of cellular uptake in tissue engineering. *University of Illinois Interdisciplinary Conference*, Urbana, IL, January 26, 2009.

139. V. Boovaragavan, V. Ramadesigan, M. Arabandi, V. Subramanian, K. Chen, R. Braatz, and H. Tsukamoto. Parameter estimation and capacity fade analysis from discharge curves of lithium-ion batteries using efficient reformulated physics based models. *215th Electrochemical Society Meeting*, San Francisco, CA, May 27, 2009. Abstract 251.

140. R. D. Braatz. Emerging problems in integrated biomedical microsystems. *Special Session on Modeling and Control of Micro and Nanosystems*, *American Control Conference*, St. Louis, MO, June 2009.

141. M. Kishida and R. D. Braatz. Optimal 3D spatial field control of nonlinear spatially distributed systems with state feedback. *IFAC Workshop on Control of Distributed Parameter Systems*, Toulouse, France, July 20-24, 2009. Abstract 27.

142. V. Boovaragavan, R. Methekar, V. Ramadesigan, V. Subramanian and R. Braatz. Dynamic optimization of lithium-ion batteries - Current profiles for improved utilization. *216th ECS Meeting*, Vienna, Austria, October 4-9, 2009. Abstract 241.

143. V. Ramadesigan, V. Boovaragavan, R. Methekar, M. Arabandi, V. Subramanian and R. Braatz. Towards model-based optimal design of lithium-ion batteries. *216th ECS Meeting*, Vienna, Austria, October 4-9, 2009. Abstract 242.

144. V. Ramadesigan, V. Boovaragavan, R. Methekar, V. Subramanian, K. Chen, and R. Braatz. Modeling capacity fade of lithium-ion batteries: Challenges in identifying and quantifying possible mechanisms. *216th ECS Meeting*, Vienna, Austria, October 4-9, 2009. Abstract 720.

145. J. C. Pirkle, Jr., V. Subramanian, and R. D. Braatz. Expediting the numerical simulation of lithium-ion battery models. *AIChE Annual Meeting*, Nashville, TN, November 8-13, 2009. Abstract 374g.

146. V. Ramadesigan, V. Boovaragavan, R. N. Methekar, V. Subramanian, K. Chen, R. D. Braatz, and J. C. Pirkle, Jr. Modeling capacity fade of lithium-ion batteries: Challenges in identifying and quantifying possible mechanisms. *AIChE Annual Meeting*, Nashville, TN, November 8-13, 2009. Abstract 200c.

147. V. Boovaragavan, R. N. Methekar, V. Ramadesigan, V. Subramanian, and R. D. Braatz. Dynamic optimization of lithium-ion batteries: Current profiles for improved utilization. *AIChE Annual Meeting*, Nashville, TN, November 8-13, 2009. Abstract 356e.

148. A. N. Ford, D. W. Pack, and R. D. Braatz. Mechanistic modeling of PLGA microparticle drug delivery systems. *AIChE Annual Meeting*, Nashville, TN, November 8-13, 2009. Abstract 178l.

149. A. N. Ford, D. W. Pack, and R. D. Braatz. Design of PLGA microparticle drug delivery systems using mechanistic reaction-diffusion model. *AIChE Annual Meeting*, Nashville, TN, November 8-13, 2009. Abstract 261d.

150. V. Subramanian, V. Ramadesigan, V. Boovaragavan, R. N. Methekar, M. Arabandi, and R. D. Braatz. Towards model-based optimal design of lithium-ion batteries. *AIChE Annual Meeting*, Nashville, TN, November 8-13, 2009. Abstract 143c.

151. J. C. Pirkle, Jr., M. Fujiwara, and R. D. Braatz. Model identification of blown film extrusion. *AIChE Annual Meeting*, Nashville, TN, November 8-13, 2009. Abstract 374b.

152. N. A. Burns, R. Basavaraj, V. Ramadesigan, F. Latinwo, R. D. Braatz, V. R. Subramanian, Identification of dominant mechanisms for capacity fade of lithium-ion batteries. *AIChE Annual Meeting*, Nashville, TN, November 8-13, 2009. Abstract 63j.

153. R. Methekar, V. Ramadesign, V. Subramanian, K. Chen, and R. D. Braatz. Continuum and multi-scale modeling of performance curves and capacity fade in lithium-ion batteries. *TMS Annual Meeting and Exhibition*, Seattle, WA, February 14-18, 2010.

154. V. Ramadesigan, R. Methekar, V. Subramanian, F. Latinwo, and R. Braatz. Optimal design of electrode material properties for lithium-ion batteries. *217th ECS Meeting*, Vancouver, BC, Canada, April 25-30, 2010. Abstract 249.

155. R. Methekar, V. Ramadesigan, V. Subramanian, and R. Braatz. Maximization of energy storage and minimization of capacity fade in lithium-ion battery pack. *217th ECS Meeting*, Vancouver, BC, Canada, April 25-30, 2010. Abstract 393.

156. V. Subramanian, V. Ramadesigan, R. Methekar, K. Chen, and R. Braatz. Continuum and multiscale modeling of performance curves and capacity fade in lithium-ion batteries. *217th ECS Meeting*, Vancouver, BC, Canada, April 25-30, 2010. Abstract 1242.

157. V. Ramadesigan, R. N. Methekar, R. D. Braatz, and V. R. Subramanian. Modeling and simulation of lithium ion batteries from systems engineering perspective. *218th ECS Meeting*, Las Vegas, NV, October 10-15, 2010. Abstract 226.

158. J. Vernille, J. E. Tabora, A. Rogers, J. Albrecht, R. D. Braatz, and M. Fujiwara. Crystallization development of a pharmaceutical API through implementation of real-time supersaturation feedback control. *AIChE Annual Meeting*, Salt Lake City, UT, November 2010. Abstract 141b.

159. X. Zhu, D. W. Pack, and R. D. Braatz. Intravascular delivery from drug-eluting stents: Effect of anisotropic diffusivity and drug loading on arterial drug distribution. *AIChE Annual Meeting*, Salt Lake City, UT, November 2010. Abstract 639f.

160. A. Rogers, J. Albrecht, J. Vernille, J. Tabora, F. Ricci, M. Fujiwara, and R. D. Braatz. Automated crystallization platform: Integrating hardware, software, and PAT to expedite the process of crystallization development. *AIChE Annual Meeting*, Salt Lake City, UT, November 2010. Abstract 355d.

161. J. C. Pirkle, Jr. and R. D. Braatz. Non-isothermal blown film extrusion including crystallization: Instabilities, multiplicities, and mapping of stable operating regions. *AIChE Annual Meeting*, Salt Lake City, UT, November 2010. Abstract 289d.

162. A. N. Ford, D. W. Pack, and R. D. Braatz. Design of PLGA microparticle drug delivery systems using a reaction-diffusion model. *AIChE Annual Meeting*, Salt Lake City, UT, November 2010. Abstract 288f.

163. B. Zeiger, M. L. Rasche, R. D. Braatz, and K. S. Suslick. Sonofragmentation: Experimental observations and population-balance modeling. *AIChE Annual Meeting*, Salt Lake City, UT, November 2010. Abstract 164f.

164. R. Lakerveld, R. D. Braatz, and P. I. Barton. A plant-wide control strategy for continuous pharmaceutical manufacturing. *AIChE Annual Meeting*, Salt Lake City, UT, November 2010. Abstract 444c.

165. V. Ramadesigan, R. N. Methekar, S. De, R. D. Braatz, and V. Subramanian. Estimation of state of charge of a lithium-ion battery pack. *AIChE Annual Meeting*, Salt Lake City, UT, November 2010. Abstract 327f.

166. R. N. Methekar, K. Chen, P. Northrop, R. D. Braatz, and V. Subramanian. Kinetic Monte Carlo simulation of surface heterogeneity for lithium-ion batteries: Passive layer formation and simulation of capacity fade. *AIChE Annual Meeting*, Salt Lake City, UT, November 2010. Abstract 636c.

167. V. Ramadesigan, J. C. Pirkle Jr., S. De, P. Northrop, R. N. Methekar, R. D. Braatz, and V. Subramanian. Modeling and simulation of lithium ion batteries from systems engineering perspective. *AIChE Annual Meeting*, Salt Lake City, UT, November 2010. Abstract 375z.

168. V. R. Subramanian, R. N. Methekar, V. Ramadesigan, and R. D. Braatz. Systems engineering of lithium ion batteries. *ASME International Mechanical Engineering Congress & Exposition*, Vancouver, British Columbia, Canada, November 12-18, 2010. Abstract IMECE2010-39928.

169. P. Northrop, R. Methekar, V. Subramanian, K. Chen, and R. Braatz. Kinetic Monte Carlo simulation of surface heterogeneity for lithium-ion batteries: Passive layer formation and simulation of capacity fade. *219th ECS Meeting*, Montreal, Canada, May 1-6, 2011. Abstract 470.

170. V. Ramadesigan, R. Braatz, G. Sikha, and V. Subramanian. Optimal design of electrode properties for Li-ion batteries using physics-based efficient reformulated models. *219th ECS Meeting*, Montreal, Canada, May 1-6, 2011. Abstract 1603.

171. V. Ramadesigan, R. Methekar, R. Braatz, and V. Subramanian. Dynamic optimization for maximization of energy storage and minimization of capacity fade. *219th ECS Meeting*, Montreal, Canada, May 1-6, 2011. Abstract 1624.

172. M. L. Rasche, B. W. Zeiger, K. S. Suslick, and R. D. Braatz. Modeling the evolution of the particle size distribution during ultrasound-induced breakage. *18th International Symposium on Industrial Crystallization*, Zürich, Switzerland, September 13-16, 2011. Poster.

173. M. Jiang, M. Fujiwara, M. H. Wong, Z. Zhu, J. Zhang, L. Zhou, K. Wang, A. N. Ford, T. Si, L. M. Hasenberg, and R. D. Braatz. Achieving a target crystal size distribution by continuous seeding and controlled growth. *18th International Symposium on Industrial Crystallization*, Zürich, Switzerland, September 13-16, 2011.

174. M. Jiang, L. Zhou, X. Zhu, M. Molaro, D. O'Grady, D. Hebrault, J. Tedesco, and R. D. Braatz. In-situ identification of two-dimensional growth and dissolution kinetics for rod-like crystals. *18th International Symposium on Industrial Crystallization*, Zürich, Switzerland, September 13-16, 2011. Poster.

175. K. Chen, L. M. Goh, G.W. He, V. Bhamidi, P. J. A. Kenis, C. F. Zukoski, and R. D. Braatz. Identification of bounds on nucleation rates in droplet-based microfluidic systems. *18th International Symposium on Industrial Crystallization*, Zürich, Switzerland, September 13-16, 2011.

176. P. Northrop, V. Subramanian, and R. Braatz. Coupling of Kinetic Monte-Carlo simulations with continuum level models to examine capacity fade. *220th ECS Meeting*, Boston, Massachusetts, October 9-14, 2011. Abstract 672.

177. V. Ramadesigan, P. Northrop, V. Subramanian, and R. Braatz. Continuous and discrete approaches for modeling capacity fade in lithium-ion batteries. *220th ECS Meeting*, Boston, Massachusetts, October 9-14, 2011. Abstract 736.

178. V. Ramadesigan, P. Northrop, S. De, S. Santhanagopalan, R. Braatz, and V. Subramanian. Multiscale modeling and simulation of lithium-ion batteries from systems engineering perspective. *220th ECS Meeting*, Boston, Massachusetts, October 9-14, 2011. Abstract 747.

179. J. E. Tabora, S. Murugesan, J. Vernille, M. L. Rasche, M. Fujiwara, and R. D. Braatz. Implementation of a high-resolution population balance solver to model pharmaceutical crystallizations. *AIChE Annual Meeting*, Minneapolis, Minnesota, October 16-21, 2011. Abstract 83b.

180. L. Zhou, K.-N. Ma, H. Feng, and R. D. Braatz. Optimal control of antisolvent and cooling crystallization. *AIChE Annual Meeting*, Minneapolis, Minnesota, October 16-21, 2011. Abstract 83c.

181. A. N. Ford, D. W. Pack, and R. D. Braatz. Modeling of dynamic hindered diffusion of drugs from biodegradable PLGA microspheres with evolving porous structure. *AIChE Annual Meeting*, Minneapolis, Minnesota, October 16-21, 2011. Abstract 101h.

182. M. Jiang, M. Molaro, M. L. Rasche, H. Zhang, K. Chadwick, L. Zhou, M. Wong, Z. Zhu, D. Hebrault, D. O'Grady, J. Tedesco, and R. D. Braatz. Estimation and modeling of crystal size and shape evolution using in situ tools. *AIChE Annual Meeting*, Minneapolis, Minnesota, October 16-21, 2011. Abstract 548a.

183. X. Zhu and R. D. Braatz. Mathematical modeling of intravascular drug delivery in drug-eluting stents with biodegradable coating. *AIChE Annual Meeting*, Minneapolis, Minnesota, October 16-21, 2011. Abstract 621e.

184. V. Ramadesigan, P. Northrop, S. De, G. Sikha, R. Braatz, and V. Subramanian. Model based optimal design of electrode architecture of lithium-ion batteries. *221st ECS Meeting*, Seattle, Washington, May 6-10, 2012. Abstract 1047.

185. V. Ramadesigan, P. W. C. Northrop, S. De, S. Santhanagopalan, R. D. Braatz, and V. R. Subramanian. Modeling and simulation of lithium-ion batteries from a systems engineering perspective. *ASME/ISCIE International Symposium on Flexible Automation* (*ISFA 2012*), St. Louis, Missouri, June 18-20, 2012. Abstract submission #7259. Submitted. Was elevated to a panel presentation, listing only Venkat R. Subramanian in the program, with no assignment of paper number.

186. R. D. Braatz and R. C. Alkire. Keynote 5: An overview of multiscale simulation algorithms: Guidelines and pitfalls to avoid. *Summer School on Molecular and Multiscale Simulation*, National Center for Supercomputing Applications, University of Illinois at Urbana-Champaign, 2012.

187. E. P. Chang, R. D. Braatz, and T. A. Hatton. Controlled emulsion droplet solvent evaporation for the continuous and consistent production of particles. *Association in Solution III - Self-Assembly: From Bio-Colloids to Nano-Engineering*. Bifröst University, Iceland, July 22-27, 2012. Poster 9.

188. P. Northrop, R. Braatz, and V. Subramanian. Simultaneous coupling of kinetic Monte-Carlo simulations with continuum models to examine capacity fade. *Pacific Rim Meeting on Electrochemical and Solid-State Science (PRiME 2012)*, *Joint International Meeting of the 222nd ECS Meeting and the 2012 Fall Meeting of the Electrochemical Society of Japan*, Honolulu, Hawaii, October 7-12, 2012. Abstract #730.

189. V. Ramadesigan, P. Northrop, R. Braatz, and V. Subramanian. Dynamic optimization using efficient reformulated models for maximizing energy storage and life of lithium-ion batteries. *Pacific Rim Meeting on Electrochemical and Solid-State Science (PRiME 2012)*, *Joint International Meeting of the 222nd ECS Meeting and the 2012 Fall Meeting of the Electrochemical Society of Japan*, Honolulu, Hawaii, October 7-12, 2012. Abstract #1082.

190. J. C. Pirkle, Jr., L. C. Foguth, S. Brenek, K. Girard, and R. D. Braatz. Modeling and simulation of coaxial crystallizers by dynamically coupled population balance,

macromixing, and micromixing models. *AIChE Annual Meeting*, Pittsburgh, Pennsylvania, October 28 – November 2, 2012. Abstract 23d.

191. Q.-L. Su, M. W. Hermanto, R. D. Braatz, M.-S. Chiu. A new extended prediction self-adaptive control (EPSAC) strategy for batch control. *AIChE Annual Meeting*, Pittsburgh, Pennsylvania, October 28 – November 2, 2012. Abstract 713g.

192. R. D. Braatz. Looking to the future in continuous pharmaceutical manufacturing. *AIChE Annual Meeting*, Pittsburgh, Pennsylvania, October 28 – November 2, 2012. Abstract 43a.

193. M. Kishida and R. D. Braatz. A model-based approach for the construction of design spaces in Quality-by-Design. *AIChE Annual Meeting*, Pittsburgh, Pennsylvania, October 28 – November 2, 2012. Abstract 146a. The presentation is available on-line in AIChE ChemE on Demand at http://www.aiche.org/resources/chemeondemand/conference-presentations/model-based-approach-construction-design-spaces-quality-design

194. A. N. Ford Versypt, D. W. Pack, and R. D. Braatz. Modeling of drug delivery from PLGA microspheres using reaction-diffusion equations with hindered diffusion. *AIChE Annual Meeting*, Pittsburgh, Pennsylvania, October 28 – November 2, 2012. Abstract 258a.

195. X. Zhu and R. D. Braatz. A predictive model for coupled polymer degradation, erosion, and drug release in PLGA biodegradable stent coatings. *AIChE Annual Meeting*, Pittsburgh, Pennsylvania, October 28 – November 2, 2012. Abstract 351e.

196. H. Jang, J. H. Lee, and R. D. Braatz. Design of a parameter and state estimation method for detecting local concentration on the surface of a carbon-nanotube based sensor. *AIChE Annual Meeting*, Pittsburgh, Pennsylvania, October 28 – November 2, 2012. Abstract 647a.

197. M. Jiang, X. Zhu, M. Molaro, M. L. Rasche, D. M. Raimondo, K.-K. Kim, H. Zhang, K. Chadwick, L. Zhou, Z. Zhu, M. Wong, D. O'Grady, D. Hebrault, J. Tedesco. and R. D. Braatz. A multidimensional population balance model for growth and dissolution identified from a designed temperature-cycling experiment. *AIChE Annual Meeting*, Pittsburgh, Pennsylvania, October 28 – November 2, 2012. Abstract 604g.

198. B. W. Bequette and R. D. Braatz. Overview of CAST activities and programming. *AIChE Annual Meeting*, Pittsburgh, Pennsylvania, October 28 – November 2, 2012. Abstract 16a.

199. A. A. Boghossian, J. Zhang, F. Le Floch-Yin, Z. Ulissi, P. Bojo, J.-H. Han, J.-H. Kim, J. Arkalgud, N. F. Reuel, R. D. Braatz, and M. S. Strano. The chemical dynamics of nanosensors capable of single-molecule detection. *AIChE Annual Meeting*, Pittsburgh, Pennsylvania, October 28 – November 2, 2012. Abstract 759e.

200. L. C. Foguth, B. Benyahia, R. Lakerveld, P. I. Barton, and R. D. Braatz. Quality-by-Design for continuous pharmaceutical manufacturing. *Symposium on Continuous Pharmaceutical Manufacturing*, Cambridge, MA, November 13, 2012. Poster.

201. R. Lakerveld, B. Benyahia, P. L. Heider, H. Zhang, S. Mascia, J. M. B. Evans, R. D. Braatz, and P. I. Barton. Plant-wide control for continuous pharmaceutical manufacturing. *Symposium on Continuous Pharmaceutical Manufacturing*, Cambridge, MA, November 13, 2012. Poster.

202. R. Lakerveld, B. Benyahia, P. L. Heider, H. Zhang, A. Wolfe, C. Testa, S. Ogden, D. R. Hersey, S. Mascia, J. M. B. Evans, R. D. Braatz, and P. I. Barton. Plant-wide control of an integrated continuous pharmaceutical pilot plant. *9th European Congress of Chemical Engineering*, World Forum, The Hague, The Netherlands, April 21-25, 2013.

203. V. Ramadesigan, B. Suthar, P. Northrop, S. Santhanagopalan, R. Braatz, and V. Subramanian. Optimal control of Li-ion batteries based on reformulated models. *223rd ECS Meeting*, Toronto, Canada, May 16, 2013. Abstract 293.

204. B. Suthar, V. Ramadesigan, P. Northrop, S. Santhanagopalan, R. Braatz, and V. Subramanian. Real time state estimation of reformulated lithium-ion battery model for advanced battery management systems (BMS). *223rd ECS Meeting*, Toronto, Canada, May 16, 2013. Abstract 294.

205. P. Northrop, V. Subramanian, and R. Braatz. Integration of a Kinetic Monte Carlo algorithm with continuum models to examine capacity fade. *223rd ECS Meeting*, Toronto, Canada, May 14, 2013. Abstract 414.

206. H. Jang, R. D. Braatz, and J. H. Lee. Integrated parameter and state estimation method for carbon nanotube-based nanosensor arrays distributed on 2D field. *9th World Congress on Chemical Engineering*, Seoul, Korea, August 18-23, 2013, Abstract FrO-T405-4.

207. J. Min, P. T. Hammond, and R. D. Braatz. Modeling pH-induced release of polyanions from weak polyelectrolyte multilayer films. *Biomedical Engineering Society* (*BMES*) *Annual Meeting*, Seattle, Washington, September 25-28, 2013. Abstract 230.

208. X. Zhu, L. Zhou, and R. D. Braatz. Efficient simulation of population balance models by an improved method of characteristics approach. *AIChE Annual Meeting*, San Francisco, California, November 3-8, 2013. Abstract 199a.

209. L. Zhou, M. Su, B. Benyahia, A. Singh, P. I. Barton, B. L. Trout, A. S. Myerson, and R. D. Braatz. Mathematical modeling and design of layer crystallization in a concentric annulus with and without recirculation. *AIChE Annual Meeting*, San Francisco, California, November 3-8, 2013. Abstract 241a.

210. B. K. Suthar, V. Ramadesigan, S. De, R. D. Braatz, and V. R. Subramanian. Optimal charging profile for mechanically constrained lithium ion battery. *224th ECS Meeting*, October 27 – November 1, 2013. Abstract 253.

211. E. Chang, R. D. Braatz, and T. A. Hatton. Evaporation of emulsion droplets for the templated assembly of spherical particles: A population balance model. *AIChE Annual Meeting*, San Francisco, California, November 3-8, 2013. Abstract 300g.

212. A. Mesbah, A. N. Ford Versypt, X. Zhu, and R. D. Braatz. Nonlinear model predictive control for a continuous pharmaceutical manufacturing system: A comparison of control strategies for a thin-film formation process. *AIChE Annual Meeting*, San Francisco, California, November 3-8, 2013. Abstract 432g.

213. A. Mesbah, R. Lakerveld, and R. D. Braatz. Plant-wide model predictive control of a continuous pharmaceutical manufacturing process. *AIChE Annual Meeting*, San Francisco, California, November 3-8, 2013. Abstract 443a.

214. M. Jiang and R. D. Braatz. Mathematical modeling and analysis of cooling crystallization within dual-impinging-jet mixers. *AIChE Annual Meeting*, San Francisco, California, November 3-8, 2013. Abstract 536a.

215. A. N. Ford Versypt and R. D. Braatz. Analysis of finite difference schemes for diffusion in spheres with variable diffusivity. *AIChE Annual Meeting*, San Francisco, California, November 3-8, 2013. Abstract 651c.

216. A. N. Ford Versypt and R. D. Braatz. Mechanistic modeling of PLGA microsphere drug delivery: Analytical autocatalytic degradation of polymer and hindered diffusion of drug. *AIChE Annual Meeting*, San Francisco, California, November 3-8, 2013. Abstract 666a.

217. M. Jiang and R. D. Braatz. Design criteria for the crystallization of pharmaceuticals within dual-impinging-jet mixers. *AAPS Annual Meeting & Exposition*, San Antonio, Texas, November 10-13, 2013. Abstract T3289.

218. P. W. C. Northrop, V. R. Subramanian, and R. D. Braatz. Integration of a 2+1D kinetic Monte Carlo algorithm with continuum models for SEI layer analysis of lithium-ion batteries. *225th ECS Meeting*, Orlando, Florida, May 11-16, 2014. Abstract 549.

219. B. Suthar, P. W. C. Northrop, S. De, V. Ramadesigan, R. D. Braatz, and V. R. Subramanian. Optimal charging profile for mechanically constrained lithium-ion batteries using reformulated pseudo two dimensional models. *225th ECS Meeting*, Orlando, Florida, May 11-16, 2014. Abstract 321.

220. L. Zhou, M. Su, S. T. Ferguson, Y. Youn, B. Benyahia, A. Singh, P. I. Barton, B. L. Trout, A. S. Myerson, and R. D. Braatz. Modeling and design of layer/falling film solution crystallization. *International Symposium for Continuous Manufacture of Pharmaceuticals*, Cambridge, Massachusetts, May 20-21, 2014

221. A. Mesbah and R. D. Braatz. Dynamic modeling and control of a pharmaceutical thin-film drying process. *International Symposium for Continuous Manufacture of Pharmaceuticals*, Cambridge, Massachusetts, May 20-21, 2014.

222. B. Suthar, P. W. C. Northrop, R. D. Braatz, and V. R. Subramanian. Optimal charging profile for lithium-ion batteries at subzero temperatures. *2014 ECS and SMEQ Joint International Meeting*, October 5-10, 2014. Abstract #42081.

223. J. Min, R. D. Braatz, and P. T. Hammond. Tunable staged release of therapeutics from layer-by-layer coating with clay interlayer barrier. *Biomedical Engineering Society* (*BMES*) *Annual Meeting*, San Antonio, Texas, October 22-25, 2014.

224. J. Min, P. T. Hammond, and R. D. Braatz. Modeling release behaviors of stimuli-responsive polyelectrolyte multilayer films. *Biomedical Engineering Society* (*BMES*) *Annual Meeting*, San Antonio, Texas, October 22-25, 2014.

225. J. Min, R. D. Braatz, and P. T. Hammond. Tunable staged release of therapeutics from layer-by-layer coating with clay interlayer barrier. *Real Time Release: The Path to Efficient Supply of High Quality Biopharmaceuticals?*, Cambridge, Massachusetts, November 14, 2014.

226. A. Mesbah, J. A. Paulson, and R. D. Braatz. Stochastic output feedback control of nonlinear systems with probabilistic uncertainties: Application to control of polymorphic transformations in batch crystallization. *AIChE Annual Meeting*, Atlanta, Georgia, November 16-21, 2014. Abstract 206a.

227. M. Jiang, Z. Zhu, E. Jimenez, J. Xu, C. Papageorgiou, J. Waetzig, A. Hardy, and R. D. Braatz. Continuous-flow tubular crystallization in slugs spontaneously induced by hydrodynamics. *AIChE Annual Meeting*, Atlanta, Georgia, November 16-21, 2014. Abstract 321b.

228. J. Min, P. T. Hammond, and R. D. Braatz. Mathematical modeling of macromolecular release of stimuli-responsive polyelectrolyte multilayer films. *AIChE Annual Meeting*, Atlanta, Georgia, November 16-21, 2014. Abstract 527a.

229. J. K. Scott, R. D. Braatz, and D. M. Raimondo. Input design for active fault diagnosis using zonotopes. *AIChE Annual Meeting*, Atlanta, Georgia, November 16-21, 2014. Abstract 587e.

230. J. Paulson, A. Mesbah, and R. D. Braatz. Stochastic model predictive control of high-dimensional systems: An end-to-end continuous pharmaceutical manufacturing case study. *AIChE Annual Meeting*, Atlanta, Georgia, November 16-21, 2014. Abstract 610b.

231. M. Jiang and R. D. Braatz. Cooling crystallization within dual-impinging-jet mixers: Mathematical modeling, theory analysis, and experimental validation. *AIChE Annual Meeting*, Atlanta, Georgia, November 16-21, 2014. Abstract 755b.

232. Richard D. Braatz, "Control of Multiscale Dynamical Systems," SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 20, 2015.

233. Kristen Severson, Jeremy G. VanAntwerp, Venkatesh Natarajan, Chris Antoniou, Jörg Thömmes, and Richard D. Braatz. Elastic net with Monte Carlo sampling for data-based modeling in biopharmaceutical manufacturing facilities. *AIChE Annual Meeting*, Salt Lake City, November 2015. Submitted on April 10, 2015. To be presented.

234. Kristen Severson, Jeremy G. VanAntwerp, Venkatesh Natarajan, Chris Antoniou, Jörg Thömmes, and Richard D. Braatz. A case study of data analytics for the manufacturing of a monoclonal antibody, *AIChE Annual Meeting*, Salt Lake City, November 2015. Submitted on April 10, 2015. To be presented.

235. Mo Jiang and R. D. Braatz. Recent advances in continuous slug-flow crystallization. *AIChE Annual Meeting*, Salt Lake City, November 2015. To be presented.

236. Mo Jiang, C. D. Papageorgiou, J. Waetzig, A. Hardy, M. Langston, and R. D. Braatz. Indirect ultrasonication in continuous slug-flow crystallization. *AIChE Annual Meeting*, Salt Lake City, November 2015. Submitted April 14, 2015. To be presented.

237. J. Min, R. D. Braatz, and Paula T. Hammond. 'Two-in-one' multilayer coatings for prosthesis-related infections. *AIChE Annual Meeting*, Salt Lake City, November 2015. To be presented.

238. J. K. Scott, D. M. Raimondo, G. R. Marseglia, and R. D. Braatz. Constrained zonotopes: A new tool for set-based computations. *AIChE Annual Meeting*, Salt Lake City, November 2015. To be presented.

239. M. L. Rasche, M. Jiang, and R. D. Braatz. Dynamic modeling and control of multi-stage slug-flow crystallization. *AIChE Annual Meeting*, Salt Lake City, 2015. To be presented.

240. Joel A. Paulson, Edward A. Buehler, Richard D. Braatz, and Ali Mesbah. Stochastic model predictive control with bounded inputs and joint state chance constraints: Application to a continuous acetone-butanol-ethanol fermentation process. *AIChE Annual Meeting*, Salt Lake City, November 2015. To be presented.

III. RESIDENT INSTRUCTION

A. Supervision of Graduate Students

1. Andrew Paul Featherstone, Ph.D. 1997, "Control Relevant Identification of Large Scale Sheet and Film Processes," Manufacturing Solutions Leader, Packaging Dynamics
2. Evan Lee Russell, Ph.D. 1998, "Process Monitoring of Large Scale Systems," Control Technology Manager, ExxonMobil
3. Jeremy Glen VanAntwerp, Ph.D. 1999, "Globally Optimal Robust Control for Large Scale Sheet and Film Processes," Professor, Department of Engineering, Calvin College
4. Ernesto Rios-Patron, Ph.D. 2000, "A Generic Framework for Nonlinear Analysis and Control," Corporate Director, Instituto Mexicano del Petroleo
5. Leo Hao-Tien Chiang, Ph.D. 2001, "Fault Detection and Diagnosis for Large Scale Systems," Senior Research Specialist, Dow Chemical Company

6. David Lei Ma, Ph.D. 2002, "Simulation and Optimization of Multidimensional Crystallization Processes," Senior Research Engineer, Pratt & Whitney
7. Timokleia Togkalidou, Ph.D. 2002, "Robust Nonlinear Control using Bilinear Matrix Inequalities with Application to a Batch Crystallization Process," General Chemical State Laboratory of Greece, Athens
8. Rudiyanto Gunawan, Ph.D. 2003, "Simulation and Optimal Control of Transient Enhanced Diffusion," Assistant Professor of Chemical and Bioengineering, Swiss Federal Institute of Technology (ETH Zürich)
9. Michael Yoo Lim Jung, Ph.D. 2003, "New Surface and Optically Stimulated Physics for Modeling Diffusion in Si" (primary advisor: Prof. E. G. Seebauer), Patent Agent, Walnut, CA
10. Timothy Owen Drews, Ph.D. 2004, "Multiscale Simulation of Nanofabricated Structures: Application to Copper Electrodeposition for Electronic Devices," Senior Software Developer, OSIsoft, Inc.
11. Eric John Hukkanen, Ph.D. 2004, "A Systems Approach to the Modeling and Control of Molecular, Microparticle, and Biological Distributions," Research Scientist, Dow Chemical
12. Effendi Rusli, Ph.D. 2006, "Modeling and Control of Nucleation and Growth Processes with Application to Electrodeposition and Crystallization Processes," Engineer, PT Lautan Luas Tbk, Indonesia
13. Xing Yi Woo, Ph.D. 2007, "Modeling and Simulation of Antisolvent Crystallization: Mixing and Control," Consultant, The Jackson Laboratory
14. Xiaohai Li, Ph.D. 2007, "Multiscale Simulation and Model-based Optimal Design of Copper Electrodeposition," R&D Engineer, Synopsys, Hillsboro, Oregon
15. Charlotte Tsz Mei Kwok, Ph.D. 2007, "Advanced Methods for Defect Engineering in Silicon," Research Scientist, Taiwan Semiconductor Manufacturing Company
16. Mohan Karulkar, Ph.D. 2007, "Additive-assisted Copper Nucleation on Gold: The Role of Multiscale Modeling," Research Engineer, Ford Motor Company
17. Martin Wijaya Hermanto, Ph.D. 2009, "Optimal Control of Solvent-Mediated Polymorphic Transformations," Institute of Chemical and Engineering Sciences, Singapore
18. Joshua Isom, Ph.D. 2009, "Exact Solution of Bayes and Minimax Change Detection Problems," R&D, Process Data Technologies Group, Air Products & Chemicals
19. Nicholas Chung Shen Kee, Ph.D. 2009, "Design and Modeling of Pharmaceutical Polymorphic Crystallization Processes," Exxon-Mobil
20. Masako Kishida, Ph.D. 2010, "Robust Optimal Boundary and Spatial Field Control of Distributed Parameter Systems" (Mechanical Science and Engineering), Lecturer, University of Canterbury
21. Ashlee Nicole Ford Versypt, Ph.D. 2012, "Modeling of Controlled-Release Drug Delivery from Autocatalytically Degrading Polymer Microspheres," Postdoctoral Fellow, MIT
22. Kwang Ki Kim, Ph.D. 2013, "Model-Based Robust and Stochastic Control, and Statistical Inference for Uncertain Dynamical Systems," Postdoctoral Fellow, Georgia Institute of Technology
23. Qinglin Su, Ph.D. 2013 (National University of Singapore), "Modeling, Monitoring, and Control of pH-shift Reactive Crystallization," Postdoctoral Fellow, University of Loughborough
24. Lifang Zhou, Ph.D. 2014, "Mathematical Modeling and Design of Novel Semi-continuous and Continuous Crystallizations" (Saudi Aramco)

25. Xiaoxiang Zhu, Ph.D. 2014, "Mathematical Modeling and Simulation of Intravascular Drug Delivery from Drug-Eluting Stents with Biodegradable PLGA Coating," Air Products
26. Mo Jiang, Ph.D. 2015, "Pharmaceutical Crystallization Design Using Micromixers, Multiphase Flow, and Controlled Dynamic Operations," postdoc at MIT
27. Michael L. Rasche, Ph.D. 2015, "Mathematical Modeling, Simulation, and Optimal Design of Pharmaceutical Crystallizers," postdoc at MIT
28. Zachary Ward Ulissi, Ph.D. 2015, "Modeling and Simulation of Stochastic Phenomena in Carbon Nanotube-Based Single Molecule Sensors," postdoc at Stanford University
29. Hong Jang, Ph.D. 2015 (KAIST), "Identification and State Estimation for Systems Involving Molecular Scale Phenomena," postdoc at KAIST

1. Andrew P. Featherstone, M.S. 1995, "Control Relevant Identification of Structured Large Scale Systems"
2. Evan L. Russell, M.S. 1996, "Multidimensional Realization and Model Reduction of Large Scale Uncertain Systems"
3. Jeremy G. VanAntwerp, M.S. 1997, "Globally Optimal Robust Control for Systems with Nonlinear Time-Varying Perturbations"
4. Ernesto Rios-Patron, M.S. 1997, "Nonlinear Stability Analysis of Discrete and Continuous Time Systems with Applications to Artificial Neural Networks"
5. Leo H.-T. Chiang, M.S. 1999, "Chemometrics and Discriminant Analysis for Fault Diagnosis"
6. David L. Ma, M.S. 1999, "Worst-case Performance Analysis of Optimal Batch Control Trajectories"
7. Timokleia Togkalidou, M.S. 1999, "Inferential Modeling in Pharmaceutical Crystallization"
8. Rudiyanto Gunawan, M.S. 2000, "Dimensionality Reduction and Robustness Analysis of Large Scale Systems"
9. Irene Fusman, M.S. 2002, "High Resolution Simulation of Multi-Dimensional Crystal Growth with Aggregation," Senior Process Engineer, Armored AutoGroup
10. Effendi Rusli, M.S. 2003, "Nonlinear Control of a Kinetic Monte Carlo-Finite Difference Simulation"
11. Joshua Isom, M.S. 2004, "Economic Design of Stateless Control Charts for Deteriorating Systems," Systems and Software Engineer, Sikorsky Aircraft
12. Xiaohai Li, M.S. 2004, "Simulation of Shape Evolution in Moving Boundary Systems"
13. Mohan Karulkar, M.S. 2004, "Multiscale Simulation of Copper Electrodeposition Along a Resistive Substrate"
14. Charlotte T. M. Kwok, M.S. 2005, "Systems-Based Modeling of a New Method for Defect Engineering in Transistor Junction Fabrication"
15. Li May Goh, M.S. 2007, "Dynamic Analysis of Pharmaceutical and Biological Systems from the Nano- to Microscale," Research Engineer, General Electric
16. Paul D. Arendt, M.S. 2008, "Controlled Drug Release Delivery Optimization of Polymer Micro Spheres and Growth of Crystals with Desired Microstructures" (General Engineering), Data Modeling Analyst, CNA
17. Kwang-Ki Kim, M.S. 2009, "Robust Control for Systems with Sector-Bounded, Slope-Restricted, and Odd Monotonic Nonlinearities Using Linear Matrix Inequalities" (Aeronautical Engineering)

18. Ashlee N. Ford, M.S. 2009, "Biodegradable Polymeric Drug Delivery: Parallel Simulation and Optimal Drug Release Profiles"
19. Xiaoxiang Zhu, M.S. 2010, "Modeling and Simulation of Coronary Stents: Intravascular Drug Delivery and Arterial Drug Distribution"
20. Michael L. Rasche, M.S. 2010, "Computational Fluid Dynamics and Population Balance Modeling of Particulate Systems"
21. Lifang Zhou, M.S. 2010, "Optimal Control of Antisolvent and Cooling Crystallization"
22. Folarin Latinwo, M.S. 2011, "Robust Optimization Techniques and Design of Li-Ion Batteries"

1. Mark Molaro, 2010-December 2015, "Optimal Design of Carbon Nanotube-based Nanobiosensors"
2. Jouha Min, 2010-December 2016, "Modeling of Molecular Release from Layer-by-Layer Polyelectrolyte Polymeric Films"
3. Lucas Foguth, 2011-2016, "Quality by Design and Control in Continuous Pharmaceutical Manufacturing"
4. Joel Anthony Paulson, 2011-2016, "Robust Model Predictive Control of Nano and Microchemical Systems"
5. Hong Jang, 2011-2015, KAIST (main advisor: Jay H. Lee), "Design of Parameter and State Estimation Methods for Inherent Stochastic Nano-/Bio-systems"
6. Dongying (Erin) Shen, 2012-2017, "Robust Model Predictive Control in Continuous Pharmaceutical Manufacturing"
7. Zhilong (Peter) Zhu, 2013-2017, "Population Balance Modeling, Design, and Control of Phosphate Mineral Processing"
8. You Peng, 2013-2017, "Experimental Investigations and Thermodynamic Modeling of Gypsum Crystallization"
9. Paphonwit Chaiwatanodom, 2013-2018
10. Kristen Ann Severson, 2013-2018
11. Amos Enshen Lu, 2013-2018
12. Moo Sun Hong, 2014-2019
13. Nicholas Walter Schickel, 2014-2019

B. Supervision of Postdoctoral Fellows/Senior Research Associates (6 current)

1. Jay Alameda, 1997-2000, Senior Research Programmer, National Center for Supercomputing Applications
2. Mst Kamrunnahar, 2001-2003, Research Associate, Center for Neural Engineering, Department of Engineering Science and Mechanics, Pennsylvania State University
3. Pui Shan (Ann) Chow, 2001, Senior Research Fellow, Institute of Chemical and Engineering Sciences, Singapore
4. Zoltan K. Nagy, 2001-2003, Professor of Chemical Engineering, Purdue University
5. Yuan (Eric) He, 2003-2005 (joint with Prof. R. Alkire), R&D Modeling Engineer, Mentor Graphics, Portland, Oregon
6. Mitsuko Fujiwara, 1999-2011, self-employed
7. J. Carl Pirkle Jr., 2000-date
8. Hong Chen, 2005-2006, Engineer, Micron, Boise

9. Lisa Bievenue, 2006-2008, Project Coordinator, University of Illinois at Urbana-Champaign
10. Kejia Chen, 2008-2009
11. Richard Lakerveld, 2010-2012 (joint with Prof. P. I. Barton), Assistant Professor, Hong Kong University of Science and Technology
12. Masako Kishida, 2010-2012, Lecturer, Canterbury University
13. Brahim Benyahia, 2011-2012 (joint with Prof. P. I. Barton), Lecturer, University of Loughborough
14. Joseph K. Scott, 2012-2013, Assistant Professor, Clemson University
15. Ashlee N. Ford Versypt, 2012-2014, Assistant Professor, Oklahoma State University
16. Stefan Streif, 2013, Assistant Professor, Ilmenau University of Technology
17. Ali Mesbah, 2012-2014, Assistant Professor, University of California, Berkeley
18. Eranda Harinath, Postdoc, 2013-date
19. Jasdeep Singh Mandur, 2014-date
20. Michael L. Rasche, 2015-date
21. Mo Jiang, 2015-date
22. Yiming Wan, 2016

C.1. Service on Ph.D. Examination Committees

UIUC: N. Agarwal (Mechanical Science and Engineering), H. An (Civil and Environmental Engineering), N. Andrews, L. Ang, M. Balmas, X. Bao, K. Benak (Material Science and Engineering), Paul Blowers, Lyndon Brown (Computer and Electrical Engineering), Kyle Carmarda, G. Channell, K. S. Cheong (prelim only), Leo Chiang (Chair), Y. P. G. Chua (Chair), M. Daley (Material Science and Engineering), A. Dalton, J. DesNoyer, Kapil Dev, P. Dimitrakopoulos, T. Drews, Steven Duke, E. Eliadis, A. Ee Lui (Chair), Andrew Featherstone (Chair), M. Forrest (prelim only), Ashlee N. Ford (Chair), Kevin Furman, Joshua Gray, Rudiyanto Gunawan (Chair), C. Gupta, Rebecca Harman-Baker (Computer Science), Guangwen He, Alice Hollister, J. Z. Hua, E. Hukkanen (Chair), Joshua Isom (Chair), Suzanne Jogun, Michael Jung, M. Karulkar, Nicholas C. S. Kee, Y. Kondratenko, Rebecca Kruse (Chemistry), Charlotte Kwok, James Ledbetter, X. Li (Chair), H.-H. Lin (Mechanical and Industrial Engineering), D. Lubomirsky, M. Luebbers, E. Lui, Diana Llera-Rodriguez, David Lei Ma (Chair), E. Metsi, Nitish Nair (MIT), S. W. Daniel Ong, Rakesh Parekh, Yan Qin, Michael Rasche (Chair), Ernesto Rios-Patron (Chair), Effendi Rusli (Chair), Evan Russell (Chair), Supreet Saini, Wolfgang Schmidt, Joseph Shectman (Mechanical and Industrial Engineering), Ryan Stephens, Kalena Stovall, S. Talreja, W. L. Tang (Chair), Fred Thomas, Tina Togkalidou (Chair), Jeremy VanAntwerp (Chair), Dirk Van Hyning, Xing Yi Woo (Chair), Feng Xue, Rama Vaidyanathan, Yannis Voudouris, Matthew Willis, Kang Wu, C. Yeung, Jennifer L. Younker, P. Zamora, L. L. Zhan Zhu

MIT: Nitish Nair, Spencer Schaber, Lifang Zhou (advisor), Xiaoxiang Zhu (advisor), Stuart Harwood, Kamil Khan, Mo Jiang (advisor), Zachary Ulissi, Sivaraman Ramaswamy, Brandon J. Reizman,

Lee William Drahushuk, Qing Xu, Mark Molaro, Jouha Min (co-advisor), Joel A. Paulson (advisor), Lucas Foguth (advisor), Tsai-ta Christopher Lai, Jicong Li, Adam Tatsuko, Dongying

(Erin) Shen (advisor), You Peng (co-advisor), Zhilong Zhu (advisor), Qing Xu, Rohit Kannan, Elizabeth M. Y. Lee, Kristen Severson (advisor), Amos Lu (advisor), Paphonwit Chaiwatanodom (advisor), Garrett Ryan Dowdy, Kosi C. Aroh, Moo Sun Hong (advisor), Nicholas Walter Schickel (advisor)

Tufts: Andrew L. Fiordalis

Washington University in St. Louis: Venkatasailanathan Ramadesigan, Paul Northrop, BharatKumar Suthar

KAIST: Hong Jang

C.2. External Examiner on Ph.D. Theses

- Cheng Cheng, Chemical and Biomolecular Engineering, National University of Singapore
- Calin-Cristian Cormos, Chemistry and Chemical Engineering, Babes-Bolyai University Cluj-Napoca, Romania
- Zhang Yong, Electrical and Computer Engineering, National University of Singapore
- Vinay Kumar Kariwala, Chemical and Materials Engineering, University of Alberta
- Ana-Maria Cormos, Chemistry and Chemical Engineering, Babes-Bolyai University, Cluj-Napoca, Romania
- Guangwen (Wen) He, Chemical and Biomolecular Engineering, National University of Singapore
- Hok Chung Alex Chen, Chemical Engineering, The University of Queensland, Australia
- Christian Lindenberg, Institute of Process Engineering, Swiss Federal Institute of Technology (ETH), Zürich
- Huang Wen, Chemical and Biomolecular Engineering, National University of Singapore

C.3. Visiting Faculty

- Rudiyanto Gunawan, Department of Chemical and Biomolecular Engineering, National University of Singapore (December 2010), now at the Institute of Chemical and Bioengineering in the Department of Chemistry and Applied Biosciences, Swiss Federal Institute of Technology (ETH Zürich)
- Rolf Findeisen, Institute for Automation Engineering, Laboratory for Systems Theory and Automatic Control, Otto-von-Guericke University Magdeburg, Germany (August 2011, Summer 2012, Summer 2013)
- Davide M. Raimondo, Dipartimento di Informatica e Sistemistica, Universita' degli Studi di Pavia, Italy (2012, 2014, 2015)
- Lixian Zhang, Research Center of Intelligent Control and Systems. Harbin Institute of Technology, China (2012-2013)
- R. Bhushan Gopaluni, Department of Chemical and Biological Engineering, University of British Columbia, Vancouver, Canada (2012-2013)
- Jeremy G. VanAntwerp, Calvin College, Grand Rapids, Michigan (2013-2014)
- Jingcai Cheng, Institute of Process Engineering, Chinese Academy of Sciences, Beijing

(2014-2015)
- Saima Noor, COMSATS Institute of Information Technology, Pakistan (2014-2015)
- Hector Budman, University of Waterloo (2015)

E. Courses Taught (with recent instructor and course scores received by students)

E.1 University of Illinois at Urbana-Champaign

1. The Chemical Engineering Profession
2. Introduction to Chemical Engineering
3. Chemical Rate Processes and Reactor Design (4.2)
4. Chemical Process Control and Dynamics
5. Open-ended Experimental Design/Process Development
6. Applied Mathematics in Chemical Engineering (graduate)
7. Large-scale Systems Theory (graduate)
8. Chemical Reaction Engineering (graduate, 4.1)
9. Advanced Topics in Heat and Mass Transfer (graduate, 4.3)
10. Electrochemical Engineering (undergraduate and graduate, 4.0)
11. Optimal Control (graduate, 4.2)
12. Systems Engineering (graduate, Spring 2009, 4.4, 4.3)

E.2 Massachusetts Institute of Technology

1. Systems Engineering (10.551, graduate, Spring 2003/2011-date)
2. Advanced Systems Engineering (10.552, graduate, Fall 2011, 6.0)
3. Materials Systems Engineering Seminar (10.985, graduate, Spring 2011-date)
4. Numerical Methods (10.34, graduate, Fall 2012-Fall 2014)
5. Analysis of Transport Phenomena (10.50, graduate, Fall 2015)

IV. SERVICE (PUBLIC, PROFESSIONAL/DISCIPLINARY, AND UNIVERSITY)

A. Service to Disciplinary and Professional Societies and Associations

1. Institute of Electrical and Electronic Engineers (IEEE)
Fellow, 2007-date; Senior Member, 2005-2007; Member, 1994-2005; Control Systems Society, 1994-date; Conference Editorial Board, Control Systems Society, 1997-2000; Robust Control Working Group, 1996-1999; Participant at the IEEE CSS/NSF Workshop on New Directions in Control Engineering Education, 1998; CSS Technical Committee on Robust Control (TCRC), 1999-2009; International Programme Committee, IEEE International Conference on Control Applications (CCA), 2000-2002; International Programme Committee, IEEE Computer-Aided Control System Design Conference, 2000-2002; Chair of the Technical Committee on Industrial Process Control, Control Systems Society (CSS), 2002-2011; Member of the Technical Committee on Industrial Process Control, Control Systems Society (CSS), 2002-date; Member of the CSS Technical Activities Board, 2002-2010; Associate Editor for Nonlinear Systems, Emerging Control Theory and Applications, Biological Systems, and Applications, Joint IEEE Conference on Decision and Control and the European Control Conference (CDC-ECC'05),

2005; IEEE Control Field Award Committee, 2007-2010; Chair for Session on Distributed Parameter Systems III, IEEE Conference on Decision and Control, 2008; IEEE Control Systems Society Award Committee, 2009-2011; Chair, Awards Subcommittee on Transactions in Control Systems Technology Outstanding Paper Award, 2009-2011; IEEE Control Systems Society Fellow Selection Committee, 2009-2010; CSS Technical Committee on Systems with Uncertainty, 2009-date; Participant, International Workshop on the Impact of Control: Past, Present, and Future, Berchtesgaden, Germany, October 18-21, 2009; CSS Board of Governors, 2010; Associate Editor, IEEE Control Systems Magazine, 2010; Deputy Editor-in-Chief, IEEE Control Systems Magazine, 2010-2011; International Program Committee, IEEE International Symposium on Computer-Aided Control System Design, 2010; Co-organizer and Co-chair for Session on Uncertainty Analysis and Robust Model Based Control, IEEE International Symposium on Computer-Aided Control System Design, 2010; International Program Committee, Joint Symposium on Computer-Aided Control System Design and Systems with Uncertainty, 2011; Co-organizer for Session on Robust Model-based Control: Part I, IEEE International Symposium on Computer-Aided Control System Design and Systems with Uncertainty, 2011; Co-organizer for Session on Robust Model-based Control: Part II, IEEE International Symposium on Computer-Aided Control System Design and Systems with Uncertainty, 2011; Task Force on Promotion of CSS Publications, 2011-2012; Editor-in-Chief, IEEE Control Systems Magazine, 2012-2014; Liaison Representative, IEEE Technical Activities Board Magazine Committee, 2012-date; Publication Activities Board, 2012-date; International Program Committee, Joint Symposium on Computer-Aided Control System Design and Systems with Uncertainty, 2013; Senior Editor, IEEE Life Sciences Letters, 2014-date; Co-Organizer for Session on New Directions in Robust Optimal Control, IEEE Conference on Decision and Control, 2014; Session Chair, SY-BIO Workshop, 2015

2. American Automatic Control Council (AACC)

Arrangements for the Model Predictive Control Workshop (for Manfred Morari and Evanghelos Zafiriou), American Control Conference, 1991; Chair for Session on Control Relevant Identification and Fault Detection, American Control Conference, 1994; Organizer and Chair for Session on Control of Uncertain Systems, American Control Conference, 1994; Chair for Session on Process Monitoring, American Control Conference, 1995; Chair for Session on Statistical Process Monitoring, American Control Conference, 1995; Co-chair for Session on Control of Sheet and Film Forming Processes, American Control Conference, 1997; Chair for Session on Parameter Identification, American Control Conference, 1998; Chair for Session on Control of Particulate Systems, American Control Conference, 2000; Chair for Session on Novel Formulations of Model Predictive Control, American Control Conference, 2001; Program Committee, American Control Conference, 2003-2005, 2007-2009, 2011; Organizer and Presenter (with Jay H. Lee and Babatunde A. Ogunnaike), Workshop on Advanced Process Control, American Control Conference, 2004; Co-Chair for Session on Process Control and Identification, American Control Conference, 2004; Co-Chair for Session on Scheduling and Discrete Event Systems, American Control Conference, 2004; Co-Chair for Session on Sliding Mode Control II, American Control Conference, 2004; AIChE Society Review Chair, 2005; Chair for Session on Modeling and Identification of Process Control, American Control Conference, 2005; Director, 2006-2007 (acting director for many subsequent years); Vice-Chair for Invited Sessions, American Control Conference, 2007; Organizing Committee, American Control Conference, 2007, 2010, 2015; Chair for Session on Biomedical Systems, 2007; Chair

for Session on Nonlinear Estimation, 2007; Chair for Session on Modeling and Simulation, American Control Conference, 2008; Organizer and Presenter (with Jay H. Lee and Joseph Lu), Workshop on Model Predictive Control with Applications, American Control Conference, 2008; Organizer and Presenter (with Mayuresh Kothare and Murti Salapaka), Special Session on Modeling and Control of Micro and Nanosystems, American Control Conference, 2009; Co-Chair for Session on Dynamic Optimization, 2009; Chair for Session on Observers for Nonlinear Systems, 2009; Co-Chair for Session on Stochastic Adaptive Control, 2009; Steering Committee, 2007-date; Program Chair, American Control Conference, 2010; Chair for Plenary Session on Sampling, American Control Conference, 2010; Chair for Semiplenary Session on Control as a Key Technology for Radical Innovation in Wind Energy Generation, 2010; Chair for Semiplenary Session on Cooperative Control and Mobile Sensor Networks in the Ocean, 2010; Presenter, Workshop on Ideas and Technology of Control Systems, American Control Conference, June 29, 2010; Member, Board of Directors Committee on Society Reimbursement, 2011; Richard E. Bellman Control Heritage Award Subcommittee, 2011-2012, 2014; IFAC 2020 World Congress Bid Committee, 2011-2013; ACC Return Target Policy Assessment Committee, 2012-2013; Donald P. Eckman Award Subcommittee, 2013; Chair for Session on Identification: Optimal Input Design and Convex Methods, 2013; General Chair, American Control Conference, 2015; Chair for Plenary Session on Energy Efficient Buildings: A Systems Approach, 2015; Chair for Semiplenary Session on New Directions in Advanced Control of Semiconductor Manufacturing, 2015; Chair for Semiplenary Session on Magnetic Control of Therapy to Hard-to-Reach Disease Targets, 2015; Vice President, 2016-date

3. International Federation of Automatic Control (IFAC)
Co-chair for Session on Multivariable and Robust Control, IFAC World Congress, 1996; International Programming Committee, 6th IFAC Symposium on Dynamics and Control of Process Systems (DYCOPS), 1999-2001; Area Chair for Biochemical and Materials Processing System Modeling and Control, 6th IFAC Symposium on Dynamics and Control of Process Systems, 2000-2001; International Programming Committee, 7th IFAC Symposium on Advanced Control of Chemical Processes (ADCHEM), 2002-2003; Chair for Session on Pharmaceutical Process Control, IFAC World Congress, 2002; International Programming Committee, IFAC Workshop on Time Delay Systems, Rocquencourt, France, September 2003; Co-chair for Session on Microelectronics Manufacturing Process Simulation and Control, IFAC Symposium on Advanced Control of Chemical Processes, Hong Kong, 2003; Technical Area Chair for Particulate and Polymer Processes, 6th IFAC Symposium on Dynamics and Control of Process Systems, Boston, 2004; Chair for Session on Batch Process Modeling and Control, 6th IFAC Symposium on Dynamics and Control of Process Systems, Boston, 2004; Member, IFAC Technical Committee on Chemical Process Control, 2005-date; Area Chair for Batch Process Modeling and Control, IFAC Symposium on Advanced Control of Chemical Processes, Gramado, Brazil, 2006; Chair for Session on Identification and Diagnosis of Mechatronic Systems, IFAC World Congress, 2008; Fellow, International Federation of Automatic Control, 2008; International Program Committee, IFAC Symposium on Advanced Control of Chemical Processes, Instanbul, Turkey, July 12-15, 2009; Journal of Process Control Best Paper Selection Committee, 2009-2011; 2012-2014; International Program Committee, IFAC Symposium on Dynamics and Control of Process Systems, 2010; Chair for Session on Process Control Applications I, IFAC World Congress, 2011; Vice-Chair, IFAC Technical Committee on Chemical Process Control, 2012-2017; Chair, International Program Committee, IFAC

Symposium on Advanced Control of Chemical Processes, Singapore, July 10-13, 2012; International Program Committee, IFAC Symposium on Fault Detection, Supervision and Safety of Technical Processes (SAFEPROCESS), 2012, 2015; IFAC Technical Committee on Biosystems and Bioprocesses, 2012-date; International Program Committee, 12th Computer Applications in Bio Technology (CAB), 2013; International Program Committee, International Symposium on Dynamics and Control of Process Systems, December 18-20, 2013; IFAC Applications Paper Prize Selection Committee, 2014; International Program Committee, IFAC Symposium on Advanced Control of Chemical Processes, Whistler, Canada, June 7-10, 2015; International Program Committee, IFAC Symposia on Dynamics and Control of Process Systems and Computer Applications in Bio Technology, June 6-8, 2016

4. American Institute of Chemical Engineers (AIChE)

Member, 1991-date; Member of the Computing and Systems Technology (CAST) Division, 1993-date; Co-chair for Session on Control Relevant Identification and Estimation, Fall Annual Meeting, 1995; Chair for Poster Session, International Conference on Chemical Process Control (CPC V), 1996; Co-chair for Session on Design and Control, Spring National Meeting, 1996; Area 10b Acting Representative to the CAST Executive Committee, Spring National Meeting, St. Louis, 1996; Chair for Session on Plant-wide and Decentralized Control, Fall Annual Meeting, 1996; Chair for Session on Robust Control, Fall Annual Meeting, 1997; Chair for Session on Plant-wide Control, Fall Annual Meeting, 1998; Co-chair for Session on Topics in Systems and Process Control, Fall Annual Meeting, 1999; Vice-Chair for Session on Advances in Process Control, Fall Annual Meeting, 2001; Chair for Session on Control with Advances in Process Control II, Fall Annual Meeting, 2002; CAST Directors' Award Panel, 2002, 2004, 2006, 2007, 2010; Chair, CAST Directors' Award Panel, 2004; CAST Division Programming Board, 2003-2005; Chair for Session on Advances in Process Control, Fall Annual Meeting, 2003; CAST Executive Committee, 2003-2007, 2010-2013; National Programming Committee, 2003-2005; WebCAST Committee, 2003-2010; Chair for Session on Modeling and Control for Microelectronics Manufacturing, Fall Annual Meeting, 2004; Program Coordinator for Systems and Process Control (Area 10b), 2005; Chair for Session on Hybrid Multiscale Simulation, Fall Annual Meeting, 2005; Chair for Session on Recent Developments in Systems and Process Control, Fall Annual Meeting, 2005; Director of CAST Division, 2005-2007; CAST Awards Committee, 2005-2013; 2015-date; Chair for Session on Nonlinear Process Control, Fall Annual Meeting, 2006; WebCAST Committee Chair, 2006-2007; EPBC Dissemination Working Group, 2007-2008; Co-chair for Systems and Process Control Centennial Session, 2008; Computing Practice Award Nominations Committee, 2008; Chair for Session on Modeling and Identification, 2009; Second Vice Chair, CAST division, 2010; Chair, CAST Awards Committee, 2010; Awards Subcommittee, R.H. Wilhelm Award in Chemical Reaction Engineering, 2010; Chair for Tentative Session on Modeling and Identification, 2010; Technical Advisory Committee, International Conference on Chemical Process Control (CPC VIII), 2010-2012; First Vice Chair, CAST division, 2011; Chair for Session in Honor of Manfred Morari's 60th Birthday I, Fall Annual Meeting, 2011; Chair for Session in Honor of Manfred Morari's 60th Birthday II, Fall Annual Meeting, 2011; Chair, Nominations Committee, CAST division, 2011, 2013; Chair, CAST division, 2012; Council of Division and Forum Officers, 2012; Chair, Nominations Committee for the David Himmelblau Award for Innovations in Computer-Based Chemical Engineering Education, 2012; AIChE's Speakers Corner, 2012-date; Past Chair, CAST

division, 2013; Nominations Committee, CAST division, 2014; Expert Panel, Pharmaceutical Discovery, Development and Manufacturing Forum Awards Ceremony, November 17, 2014

5. National Academy of Engineering/The National Academies
Invited Participant, Tenth German-American Frontiers of Engineering Symposium, April 25-28, 2007; Organizing Committee, India-American Frontiers of Engineering (IAFOE) Symposium, Irvine, California, February 28-March 1, 2008; Co-Chair for Session on Manufacturing in the Chemical and Automotive Industries, IAFOE Symposium, 2008; Invited Participant, 7th Annual National Academies Keck Futures Initiative (NAKFI) Conference, The National Academies, Irvine, California, November 19-22, 2009

6. EFCE Working Party on Computer Aided Process Engineering
International Programming Committee, Joint International Symposium on Process Systems Engineering and European Symposium on Computer Aided Process Engineering, Trondheim, Norway, 1997; Subcommittee on Control and Operations, Joint International Symposium on Process Systems Engineering and European Symposium on Computer Aided Process Engineering, 1997; Chair for Session on Control Structure Design, Joint International Symposium on Process Systems Engineering and European Symposium on Computer Aided Process Engineering, 1997; International Program Committee, Joint Process Systems Engineering/European Symposium on Computer Aided Process Engineering, Garmisch-Partenkirchen, Germany, 2005-2006; International Scientific Committee, European Symposium on Computer Aided Process Engineering, Bucharest, Romania, May 27-30, 2007

7. Computer Aids in Chemical Engineering Education (CACHE)
Coauthor of "Experimental Projects for the Process Control Laboratory," CACHE News, Fall 2002 (invited reprint); Coauthor of "A Quadruple Tank Process Control Experiment," *CACHE News*, Fall 2004 (invited reprint); Lead, Statistics Activities (2013-date); Member, Awards Committee (2014-date); Author of "Teaching Statistics in Selected Chemical Engineering Departments," *CACHE News*, Summer 2014

8. American Society for Engineering Education (ASEE)
Member, 1996-date; Co-organizer for the Session on the Role of the Computer in Undergraduate Process Control Education, ASEE Summer School for Chemical Engineering Faculty, 1997

9. Miscellaneous Chairs/Organization
Organizer for Workshop on Control Techniques from Biological Inspiration, Annual Conference on Neural Information Processing Systems, 1994; Co-Organizer for Second Midwest Process Control Workshop, 1996; Chair for Session on Process Control, Allerton Conference on Communication, Control, and Computing, 1996; Organizer and Session Moderator for the Third Midwest Process Control Workshop, 1999; Organizer and Session Moderator for the Control 2000 Symposium, 2000; Co-chair for Session on Biomineralization, Pharmaceuticals, and Food Crystallization, Symposium D: Crystallization and Interfacial Processes, International Conference on Materials for Advanced Technologies, 2001; Vice-Chairman for Session on Process Systems Engineering 3, 3rd Chemical Engineering Conference for Collaborative Research in Eastern Mediterranean, 2003; Afternoon Session Chair for Symposium B: Pharmaceuticals, Polymers, & Fine Chemicals, Annual Meeting of the British Association for

Crystal Growth, 2005; Organizing Committee, Frontiers in Chemical Engineering Educational Workshop, AIChE Annual Meeting, 2005; International Advisory Board, Control of Particulate Processes VII, 2006; Co-Organizer for Process Systems Engineering Consortium Meeting, 2005, 2006, 2008, 2009, 2011 (all with corresponding workshops); Organizer and Moderator for Process Systems Engineering Consortium Meeting, 2007, 2010, 2013; Organizer for the Workshop on Advanced Crystallization Technologies, 2007; Co-organizer for Session on Recent Advances and Problems in Modeling Nucleation, 15th Larson Workshop, Association for Crystallization Technology, 2007; Co-Organizer for Workshop on Population Balance Modeling and Its Applications, 2008; Scientific Committee, International Symposium on Industrial Crystallization, 2008; Discussion Leader for Session on Best Practices for Curriculum/Course Development/Outreach to the General Public, Global NSEE Workshop, 2008; Steering Committee, Larson Workshops, Association for Crystallization Technology, 2009-2012; Organizer and Co-presenter for Workshop on Crystallization, Santa Barbara, California, 2009; Organizer and Chair for Session on High Throughput Screening and Microreactor Technology for Crystallization, 16th Larson Workshop, Association for Crystallization Technology, 2009; Organizer and Chair for Session on New and Emerging Technologies for Crystallization, 17th Larson Workshop, Association for Crystallization Technology, 2010; Co-presenter for Short Course on Pharmaceutical Crystallization and Downstream Processing: Batch and Continuous Processing, MIT, Cambridge, June 13-15, 2011; Organizer for the Quality by Design Workshop, 2011, 2013; Scientific Committee, International Symposium on Industrial Crystallization, 2011, 2014; Co-organizer for Session on Novel and Emerging Crystallization Technology, 18th Larson Workshop, Association for Crystallization Technology, 2012; Organizer, Summer School on Molecular and Multiscale Simulation, National Center for Supercomputing Applications, University of Illinois at Urbana-Champaign, 2012

9. Miscellaneous Society Memberships

Member, Society for Industrial and Applied Mathematics, 1994-1998; Member, Technical Association of the Pulp and Paper Industry, 1995-1998; Member, Alpha Chi Sigma, 1994-date; Member, Materials Research Society, 2001-2002; Member, American Chemical Society, 2002-2003, 2006-2008; Member, Society of Manufacturing Engineers, 2003-2005; Member, ISA, 2003-2005; Senior Member, ISA, 2005-2008; Member, Electrochemical Society, 2005-2008; Member, American Association for the Advancement of Science (AAAS), 2007-2008; AAAS Fellow, 2008-date

10. Reviewer for

National Science Foundation; U.S. Department of Energy; American Chemical Society Petroleum Research Fund; U.S. Office of Naval Research; U.S. Naval Sea Systems Command; U.S. Department of Agriculture; United Kingdom Engineering & Physical Sciences Research Council; Netherlands Foundation for Fundamental Research on Matter; Netherlands Organization for Scientific Research; National Sciences and Engineering Research Council of Canada; Research Council of Norway; Austrian Science Fund; A*Star Science and Engineering Research Council of Singapore; Chilean Comisión Nacional de Investigación Científica y Tecnológica; Springer Verlag Lecture Notes on Control and Information Science Series; IEEE Transactions on Automatic Control; Automatica; PLoS Computational Biology; Lab on a Chip; Journal of Computational Physics; SIAM Journal on Control and Optimization; Applied Numerical Mathematics; Optimization Letters; Crystal Growth and Design; Journal of

Applied Physics; Journal of Rheology; Rheologica Acta; Journal of Colloid and Interface Science; Systems & Control Letters; Electrochimica Acta; Analytical Chemistry; Journal of the Electrochemical Society; IEEE Transactions on Semiconductor Manufacturing; Journal of Microelectromechanical Systems; Mathematical Programming Series B; Linear Algebra and its Applications; IEEE Transactions on Robotics & Automation; Journal of Mathematical Analysis and Applications; Journal of Crystal Growth; CrystEngComm; The Journal of Physical Chemistry B; Physica E; Journal of Pharmaceutical Sciences; Macromolecular Theory & Simulations; Colloids and Surfaces A: Physicochemical and Engineering Aspects; AIChE Journal; IEEE Transactions on Control Systems Technology; Chemometrics and Intelligent Laboratory Systems; Journal of Process Control; Organic Process Research and Development; Mathematical Biosciences; Molecular Pharmaceutics; Drug Delivery Letters; Current Drug Delivery; Medical & Biological Engineering & Computing; Process Biochemistry; Processes; IEEE/ASME Transactions on Mechatronics; IEEE Transactions on Neural Networks; Journal of Physics and Chemistry of Solids; International Journal of Modern Physics B; Biotechnology Progress; Computers & Chemical Engineering; Chemical Engineering Science; International Journal of Robust and Nonlinear Control; Spectroscopy Letters; Journal of Sensors; Polymer Engineering & Science; Journal of Applied Polymer Science; Polymer International; Particle & Particle Systems Characterization; Optimal Control Applications & Methods; IET Control Theory and Applications; International Journal of Control; Optimization and Engineering; ASME Journal of Dynamical Systems, Measurement, and Control; International Journal of Modelling and Simulation; International Journal of Heat and Mass Transfer; Asian Journal of Control; Journal of the Franklin Institute; IIE Transactions; European Journal of Control; Canadian Journal of Chemical Engineering; ESAIM Journal on Control, Optimization, and the Calculus of Variations; International Journal of Applied Mathematics & Computer Science; Simulation: Transactions of the Society for Modeling and Simulation International; Chemical Engineering Research and Design - Part A: Transactions of the Institution of Chemical Engineers; Chemical Engineering and Processing; International Journal of Systems Science; International Journal of Intelligent Automation and Soft Computing; Environmental Science & Technology; Separation Science and Technology; ISA Transactions; ASCE Journal of Natural Hazards; Resources, Conservation, and Recycling; Dynamics and Control; Journal of Complexity; IEEE Transactions on Industrial Electronics; Particuology; Chemical Engineering Communications; Chemical Engineering Education; Pulp & Paper Canada; Latin American Applied Research; Brazilian Journal of Chemical Engineering; Journal of Zhejiang University; Prentice Hall (textbook review); McGraw-Hill (textbook review); Wiley (research monograph and textbook reviews); Cambridge University Press (textbook review); Oxford University Press (textbook review); IFAC World Congress; IEEE Conference on Decision and Control; IEEE International Conference on Control Applications; IEEE International Symposium on Intelligent Control; IEEE International Conference on Industrial Technology; American Control Conference; European Control Conference; International Symposium on Advanced Control of Chemical Processes; Foundations of Computer-Aided Process Design; Foundations of Computer-Aided Process Operations; Process Systems Engineering; International Conference on Chemical Process Control; International Symposium on Chemical Reaction Engineering; European Symposium on Computer Aided Process Engineering; IFAC Symposium on Dynamics and Control of Process Systems; IFAC Symposium on Fault Detection, Supervision, and Safety of Technical Processes; IFAC Workshop on Time Delay Systems; IFAC Symposium on Advances in Control Education; World Congress of Chemical Engineering; NUMDIFF

Conference on Numerical Treatment of Differential Equations; Mediterranean Conference on Control and Automation; ASME Annual Dynamic Systems and Control Conference; IEEE Symposium Series on Computational Intelligent Doctoral Consortium; Indian Control Conference; AIChE Annual Meeting

B. University/Campus Service

1. Massachusetts Institute of Technology (MIT):
MITEI Steering Committee, Research Center for Environmental Protection at Hydrocarbon Energy Production Frontiers (2010-2014); Skolkovo Tech Faculty Search Committee, Energy sub-committee (2013-2015)

2. Chemical Engineering (MIT):
Graduate Admissions Officer (2010-2015); Graduate Admissions Committee (2010-date); Graduate Committee (2010-date); Qualifying Exam Committee, Transport Area (2010-date); ACCESS Sub-committee (2011-date); Class of 2014 Advisor (2011-2014); Awards Committee (2011-date); Faculty Search Committee (2013-date); Faculty Mentor for James W. Swan (2013-date); Class of 2017 Advisor (2014-date); Graduate Officer (2015-date)

3. University of Illinois at Urbana-Champaign (UIUC):
UIUC/Hertz Fellowship (1994-2002, 2004-2008); UIUC Senator (1999-2001); Research Computing Working Group for UIUC Information Technology Strategic Plan (2006-2007); Informatics PhD Development Committee (2008-2009); Named Faculty Appointment Committee (2009-2010)

4. National Center for Supercomputing Applications (UIUC):
Intranet Advisory Committee (1998); Subcommittee on Grants and Contracts (1998); Local Anchor, Chemical Engineering Applications Technology Team (1997-2000)

5. College of Liberal Arts and Sciences (UIUC):
Faculty Mentor, LAS Teaching Academy (2001-2002); LAS Executive Committee (2003-2005); SCS Director Search Committee (2005-2006)

6. College of Engineering (UIUC):
Placement (1994-1995); Executive Subcommittee on Strategic Planning for Computers and Networks (1994-1997); Library (1994-2001); Executive Subcommittee on Computers and Networks (1997-2001); Computational Science and Engineering Steering Committee, Chemical Engineering Representative (1999-2001); Chair for the Bioengineering Graduate Curriculum (2000-2001); Acting Departmental Representative on Administrative Committee and Department Heads Meeting (September 2003; April 2004; April 2009); Executive Subcommittee to Review GE/TE courses (Managing Advanced Technology in Industry and Case Studies in Advanced Technology Management in Industry), 2007; Chair, Executive Subcommittee to Review ECE courses Large-scale System Analysis, Power System Control, Power System Dynamics & Stability (2007); Chair, Executive Subcommittee to Review CS course Introduction to Bioinformatics (2007); Alternate Departmental Representative to the Executive Committee (served August 26, September 30, October 14 & 21, November 4, December 16, 2008; March

10, 2009); Internal Review Panel for Pre-proposals to the NSF Materials Research Instrumentation Program (2009)

7. School of Chemical Sciences (UIUC):
Library (1994-1995); Graduate Student Recruitment (1994-1995); Coordinating Committee for Computer and Electronic Services (1998); Computer Center Advisory Committee (1997-2000); CANS Scientific Software Consultant Search (1999); Computer Applications and Network Services-Electronic Services (1999-2000); CANS Research Programmer Search (2001); Courses and Curricula (2000-2002); Chapter Advisor for the Zeta Chapter of Alpha Chi Sigma (2000-2002); Executive Committee (2004-2007); Endowed Professor Selection Committee (2006); Materials Chemistry Laboratory Review (2008)

8. Chemical Engineering/Chemical and Biomolecular Engineering (UIUC):
Graduate Student Awards (1994-1995); Shen Postdoctoral Fellowship (1994-1995, 1999); Graduate Recruiting (1994-1997); Grading Appeals (1996-1997); Workstation Manager (1995-1998); Renovation, Undergraduate Control Laboratories (1996-1999); Administrative (1994-2010); Administrative Squad C leader (1996-1997); Computer Facilities (1995-2002, 2003-2006); Undergraduate Advising (1994-2002, 2003-2009); Staff (2000-2010); Systems Bioinformatics (2001-2002); Chair, Undergraduate Curriculum (2001-2002); Senior Staff (2002-2010); Development (2004-2006); Undergraduate Grievance Capricious Grading (2005-2006); Chair, Faculty Recruiting Committee, hired four faculty in the bio area, two in tissue engineering (2005-2009); Awards (2005-2007); Campaign Committee (2008); Chair, Grading Policy Committee (2008); Session Chair, Oral Qualifying Committee (2009)

9. Bioengineering (UIUC):
Reviewer for Senior Thesis (Brian Kritzberg, 2005); Participated in graduate recruiting (2005)

10. Mechanical Science and Engineering (UIUC):
Participated in interviews of potential faculty (2007)

Last Updated on 10/1/2015