Curriculum Vitae

Michael A. Henson

Department of Chemical Engineering
University of Massachusetts
Amherst, MA 01003-3110

EDUCATION

B.S. Chemical Engineering, University of Colorado, Boulder, Colorado, 1985.
M.S. Chemical Engineering, University of Texas, Austin, Texas, 1988.
Ph.D. Chemical Engineering, University of California, Santa Barbara, California, 1992.
Post-doctoral, Advanced Process Control Group, DuPont Company, Wilmington, Delaware, 1992–1993.

RESEARCH EXPERIENCE

Assistant Professor, Department of Chemical Engineering, Louisiana State University, Baton Rouge, Louisiana, 1994–1999.
Associate Professor, Department of Chemical Engineering, Louisiana State University, Baton Rouge, Louisiana, 1999–2002.
Humboldt Research Fellow, Institute of Biochemical Engineering and Institute for Systems Theory in Engineering, University of Stuttgart, Stuttgart, Germany, 2001–2002.
Associate Professor, Department of Chemical Engineering, University of Massachusetts, Amherst, MA, 2002–2004.
Professor, Department of Chemical Engineering, University of Massachusetts, Amherst, MA, 2004–present.
Director, Center for Process Design and Control, University of Massachusetts, Amherst, MA, 2004–2015.
Co-Director, Institute for Massachusetts Biofuels Research (TIMBR), 2007–present.
Visiting Professor, Department of Systems Biology, Harvard Medical School, Boston, MA, January–August, 2009.

AWARDS

Career Development Award, National Science Foundation, 1995.
Cross-Holloway Award for Excellence in Research and Service, Louisiana State University, 1998.
James McLaurin Shivers Professorship, Louisiana State University, 1999.
Research Fellowship, Alexander von Humboldt Foundation, 2001.
College of Engineering Outstanding Senior Faculty Award, 2008.

CURRENT PROFESSIONAL ACTIVITIES

Founding Editor-in-Chief, Processes, since 2012.
Associate Editor, IET Systems Biology, since 2009.
Associate Editor, IEEE Life Science Letters, since 2014.
Editorial Board, PeerJ, since 2015.

Member, Technical Committee on Industrial Process Control, IEEE Control Systems Society, since 2002.
Member, Technical Committee on Chemical Process Control, International Federation of Automatic Control (IFAC), since 2003.
President and Trustee, Computer Aids for Chemical Engineering (CACHE), 2016–2018.

RECENT PUBLICATIONS

Total: 1 edited book, 5 book chapters, 109 journal publications, 42 conference publications

Journals

1. Kolewe, M. E., S. C. Roberts and M. A. Henson, "A Population Balance Equation Model of Aggregation Dynamics in *Taxus* Suspension Cell Cultures," *Biotechnology and Bioengineering*, **109**, 472–482 (2012).

2. Maindarkar, S., N. B. Raikar and M. A. Henson, "Incorporating Drop Coalescence in Population Balance Equation Model for High Pressure Homogenization," *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, **396**, 63-73 (2012).

3. Hanly, T. J., M. Urello and M. A. Henson, "Dynamic Flux Balance Modeling of *S. cerevisiae* and *E. coli* Co-cultures for Efficient Consumption of Glucose/Xylose Mixtures," *Applied Microbiology and Biotechnology*, **93**, 2529–2541 (2012).

4. Yang, Y., A. Corona III and M. A. Henson, "Experimental Investigation and Population Balance Equation Modeling of Solid Lipid Nanoparticle Aggregation Dynamics," *Journal of Colloids and Interface Science*, **374**, 297–307 (2012).

5. Mahadevan, R. and M. A. Henson, "Genome-based Modeling and Design of Metabolic Interactions in Microbial Communities", *Computational and Structural Biotechnology Journal*, **3**: e201210008. dx.doi.org/10.5936/csbj.201210008 (2012).

6. Maindarkar, S., P. Bongers and M. A. Henson, "Predicting the Effects of Surfactant Coverage on Drop Size Distributions of Homogenized Emulsions," *Chemical Engineering Science*, **89**, 102–114 (2013).

7. Henson, M. A., "Multicellular Models of Intercellular Synchronization in Circadian Neural Networks," *Chaos, Solitons and Fractals*, **50**, 48–64 (2013).

8. Hanly, T. J. and M. A. Henson, "Dynamic Metabolic Modeling of a Microaerobic Yeast Coculture: Predicting and Optimizing Ethanol Production from Glucose/Xylose Mixtures," *Biotechnology for Biofuels*, **6**, 44, doi:10.1186/1754-6834-6-44 (2013).

9. Atmuri, A., M. A. Henson and S. R. Bhatia, "Predicting Regimes of Controlled Nanoparticle Aggregation," *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, **436**, 325–332 (2013).

10. Hanly, T. J. and M. A. Henson, "Dynamic Model-Based Analysis of Furfural and HMF Detoxification by Pure and Mixed Batch Cultures of *S. cerevisiae* and *S. stipitis*," *Biotechnology and Bioengineering*, **111**, 272-284 (2014).

11. Yang, Y., A. Corona III, B. Schubert, R. Reeder and M. A. Henson, "The Effect of Oil Type on the Aggregation Stability of Nanostructured Lipid Carriers," *Journal of Colloids and Interface Science*, **418**, 261-272 (2014).

12. Maindarkar, S., A. Dubbelboer, J. Meuldijn, H. Hoogland and M. A. Henson, "Prediction of Emulsion Drop Size Distributions in Colloid Mills," *Chemical Engineering Science*, **118**, 114–125 (2014).

13. Henson, M. A., "Dynamic Flux Balance Analysis for Synthetic Microbial Communities," *IET Systems Biology*, **8**, 214–229 (2014).

14. Dodda, A. G., K. Saranteas and M. A. Henson, "Using On-Line Mass Spectrometry to Predict the End Point during Drying of Pharmaceutical Products," *Organic Process Research and Development*, **19**, 122–131 (2015).

15. Maindarkar, S., H. Hoogland and M. A. Henson, "Predicting the Combined Effects of Oil and Surfactant Concentrations on the Drop Size Distributions of Homogenized Emulsions," *Colloids and Surfaces A: Physicochemical and Engineering Aspect*, **467**, 18–30 (2015).

16. Henson, M. A., "New and Notable: Understanding Environmental Adaptation of the Fungal Circadian Clock with Mathematical Modeling," *Biophysical Journal*,**108**, 1580–1582 (2015).

17. Yang, Y., S. R. Bhatia, A. Corona III and M. A. Henson, "The Controlled Aggregation and Tunable Viscosity of Nanostructured Lipid Carrier Dispersions," *Colloids and Surfaces A: Physicochemical and Engineering Aspect*, **482**, 138-147 (2015).

18. Chen, J., J. A. Gomez, K. Hoffner, P. I. Barton and Michael A. Henson, "Metabolic Modeling of Synthesis Gas Fermentation in Bubble Column Reactors," *Biotechnology for Biofuels*, **8**, 89, doi:10.1186/s13068-015-0272-5 (2015).

19. Su, J. and M. A. Henson, "Circadian Gating of the Mammalian Cell Cycle Restriction Point: A Mathematical Analysis," *IEEE Life Science Letters*, **1**, 11–14, doi:10.1109/LLS.2015.2449511 (2015).

20. Dodda, A. G., M. A. Henson and K. Saranteas, "Multiphase Transport Modeling for Vacuum Drying of Pharmaceutical Products," *AIChE Journal*, **61**, 3639-3655, doi:10.1002/aic.14879 (2015).

21. Maindarkar, S., H. Hoogland and M. A. Henson, "Achieving Target Emulsion Drop Size Distributions using Population Balance Equation Models of High Pressure Homogenization," *Industrial Engineering and Chemistry Research*, **54**, 10301-10310, doi:10.1021/acs.iecr.5b01195 (2015).

22. Henson, M. A.,"Genome-Scale Modeling of Microbial Metabolism with Temporal and Spatial Resolution," *Biochemical Society Transactions*, **43**, 1164–1171, doi:10.1042/BST20150146 (2015).

23. Kingsbury, N. J., S. R. Taylor and M. A. Henson, "Inhibitory and Excitatory Networks Balance Cell Coupling in the Suprachiasmatic Nucleus: A Modeling Approach," *Journal of Theoretical Biology*, **397**, 135–144, doi:10.1016/j.jtbi.2016.02.039 (2016).

24. Chen, J., P. Phalak, J. A. Gomez, K. Hoffner, P. I. Barton and M. A. Henson, "Spatiotemporal Modeling of Microbial Metabolism," *BMC Systems Biology*, **10**, 21, doi: 10.1186/s12918-016-0259-2 (2016).

25. Chang, L., X. Liua and M. A. Henson, "Nonlinear Model Predictive Control of Fed-batch Fermentations using Dynamic Flux Balance Models," *Journal of Process Control*, **42**, 137-149, doi:10.1016/j.jprocont.2016.04.012 (2016).

26. Wilson, S.A., S. Maindarkar, M. Vilkhovoy, M. A. Henson, and S. C. Roberts, "Development of a Population Balance Equation Model to Modulate Shear for the Control of Aggregation in *Taxus* Suspension Cultures," *Biotechnology and Bioengineering*, in revision.

27. Phalak, P., J. Chen, R. P. Carlson and M. A. Henson, "Metabolic Modeling of a Chronic Wound Biofilm Consortium Predicts Spatial Partitioning of Bacterial Species," *BMC Systems Biology*, submitted.

28. Chen, J. and M. A. Henson, "*In silico* Metabolic Engineering of *Clostridium ljungdahlii* for Synthesis Gas Fermentation," *Metabolic Engineering*, submitted.

29. Fu, Y., L. Chang, M. A. Henson and X. Liu, "Dynamic Matrix Control of a Simulated Bubble Column Reactor for Synthesis Gas Fermentation," *Control Engineering Practice*, submitted.

Conference Proceedings

1. Maindarkar, S. and M. A. Henson, "Achieving Target Emulsion Drop Size Distributions using Population Balance Equation Models of High Pressure Homogenization," Proc. IFAC International Symposium on Dynamics and Control of Process Systems (2013).

2. Hanly, T. J. and M. A. Henson, "Unstructured Modeling of a Synthetic Microbial Consortium for Consolidated Production of Ethanol," Proc. IFAC Symposium on Computer Applications in Biotechnology (2013).

3. Hanly, T. J., A. Tierman and M. A. Henson, "Validation and Optimization of a Yeast Dynamic Flux Balance Model Using a Parallel Bioreactor System," Proc. IFAC Symposium on Computer Applications in Biotechnology (2013).

4. Phalak, P., J. Chen, R. P. Carlson and M. A. Henson, "Spatiotemporal Metabolic Modeling of a Chronic Wound Biofilm Consortium," Proc. Foundations of Systems Biology in Engineering, submitted.

5. Henson, M. A. and P. Phalak, "*In silico* Analysis of *Clostridium difficile* Biofilm Metabolism and Treatment," Proc. Foundations of Systems Biology in Engineering, submitted.

RECENT PRESENTATIONS

Total: 66 invited, 125 contributed

Invited Presentations

1. Henson, M. A., "Dynamic Metabolic Modeling of Microbial Consortia for Consolidated Ethanol Production," Center Systems Biology, University of Stuttgart, January 2012.

2. Henson, M. A., "Multicellular Modeling of Intercellular Synchronization in Circadian Neural Networks", Foundations of Systems Biology and Engineering, Tsuruoka, Japan, October 2012.

3. Henson, M. A., "Dynamic Flux Balance Modeling of Sugar Metabolism and Inhibitor Detoxification by a Synthetic Yeast Consortium ", Society for Industrial Microbiology and Biotechnology, San Diego, CA, August 2013.

4. Henson, M. A., "Dynamic Metabolic Models for Analysis and Design of Synthetic Microbial Communities," Department of Chemical and Biomolecular Engineering, University of Delaware, March 2014.

5. Henson, M. A., "Dynamic Metabolic Models for Analysis and Design of Synthetic Microbial Communities," Department of Chemical and Biomolecular Engineering, University of Illinois, October 2014.

6. Henson, M. A., "Spatiotemporal Modeling of Microbial Metabolism," Department of Chemical Engineering, University of Virginia, April 2015.

7. Henson, M. A., "Spatiotemporal Metabolic Modeling of Microbial Biofilm Consortia," Metabolic Pathway Analysis 2015, Braga, Portugal, June 2015.

8. Henson, M. A., "Spatiotemporal Modeling of Microbial Metabolism", Foundations of Systems Biology and Engineering, Cambridge, MA, August 2015.

9. Henson, M. A., "Metabolic Modeling and Engineering of *Clostridium ljungdahlii* for Synthesis Gas Fermentation", Lanzatech, Skokie, IL, October 2015.

10. Henson, M. A., "Spatiotemporal Modeling of Microbial Metabolism," Department of Chemical and Biological Engineering, University at Buffalo, March 2016.

11. Henson, M. A., "Monitoring and Optimization of API Drying Processes", MassBiologics, Boston, MA, April 2016.

RECENT TEACHING EXPERIENCE

Mathematical Modeling (ChE 231), Spring 2016.
Mathematical Modeling (ChE 361), Spring 2012, Spring 2013, Spring 2014, Spring 2015.
Chemical Process Control (ChE 446), Fall 2012, Fall 2013, Fall 2014, Fall 2015, Fall 2016.