

## Curriculum Vitae of David Hodge

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Updated: 13 November, 2009

### Education

Aug 2005 **Ph.D. in Chemical Engineering**, Colorado State University, Ft. Collins, Colorado. Dissertation: *Optimization of High Solids Lignocellulosic Biomass Conversion for Ethanol Production*, Advisor: Dr. M. Nazmul Karim

June 2002 **M.S. in Chemical Engineering**, Colorado State University, Ft. Collins, Colorado. Thesis: *Modeling and Predictive Control of Recombinant *Zymomonas mobilis* Fed-Batch Fermentation*, Advisor: Dr. M. Nazmul Karim

June 1999 **B.S. in Chemical Engineering**, (*cum laude*). Auburn University, Auburn, Alabama. Specialization in Pulp and Paper Engineering

### Experience

Nov. 2008-present **Assistant Professor (tenure track)**, Department of Chemical Engineering and Materials Science, joint appointment with Biosystems and Agricultural Engineering, Michigan State University, East Lansing, Michigan

Feb 2006-Oct 2008 **Research Assistant Professor (*forskarassistent*)**, Department of Chemical Engineering, Luleå University of Technology, Luleå, Sweden

Nov 2003-Feb 2006 **Postdoctoral Scientist, Research Engineer**, National Bioenergy Center, National Renewable Energy Laboratory (NREL), Golden, Colorado

Aug 1999-Nov 2003 **Research/Teaching Assistant**, Department of Chemical Engineering, Colorado State University, Ft. Collins, Colorado

June 1996-Mar 1998 **Control Systems Engineering Cooperative Education Student**, Mead Coated Board (currently Mead-Westvaco), Phenix City, Alabama

### Courses Taught

Mass and Energy Balances	Michigan State University
Biomass Conversion Engineering	Michigan State University
Sustainable Bioenergy Systems	Michigan State University
Bioprocess Engineering Course and Laboratory	Luleå University of Technology
Fermented Beverage Technology Laboratory	Luleå University of Technology
Unit Operations Laboratory	Colorado State University
Process Control Laboratory	Colorado State University
Chemical Engineering Design Laboratory (ASPEN)	Colorado State University

### Professional Service

Journal Reviewer: *Biotechnology and Bioengineering, Applied Biochemistry and Biotechnology, Bioresource Technology, Energy and Fuels, Applied Energy, Journal of Environmental Engineering, Letters in Applied Microbiology, Biotechnology for Biofuels, Enzyme and Microbial Technology*

Professional Organizations: American Institute of Chemical Engineers (AIChE), Society for Industrial Microbiology (SIM), American Society for Engineering Education (ASEE)

Conference Organization: Session Co-chair, Poster Session: Sustainability and Sustainable Biorefineries. AIChE Annual Meeting, 2009, Nashville, TN.

Reviewer: U.S. Dept. of Transportation. South Central Sun Grant Initiative. 2009.  
Province of Québec, Fonds Québécois de la Recherche sur la Nature et les Technologies, 2009.

### **Funding**

\$125000 2009-2010 PI: Characterization and Scale up of Alkaline Peroxide Pretreatment, U.S. Dept. of Energy. Great Lakes Bioenergy Research Center.

\$150000 2009-2011 PI: Fractionation of Alkaline Pulping Liquors for Fuel and Chemical Production. U.S. Dept. of Transportation. Northeast Sun Grant Initiative.

\$330000 2008-2011 MSU New Faculty Start-up Package

\$36000 2007 Production of Succinic Acid using Feedstocks from the Forest. Processum Biorefinery Initiative AB

\$50000 2007 Kempe Foundation Endowed Fellowship

\$4500 2007 Sterilization Requirements for *Saccharomyces cerevisiae* TMB3400F-30-3. SEKAB E-Technology

### **Students and Personnel Advised and Mentored**

#### **PhD Students**

Daniel Williams Chemical Engineering, Michigan State University, Project: *Quantifying Mass Transfer Limitations in High-Solids Enzymatic Saccharification of Lignocellulose*. Fall 2008-present

Ryan Stoklosa Chemical Engineering, Michigan State University, Project: *Fractionation of Alkaline Pretreatment Liquors for Fuel and Chemical Production*. Fall 2008-present

Muyang Li Chemical Engineering, Michigan State University, Project: *Biomimetic Plant Cell Wall Nanocomposites as a Model System for Characterizing Chemical and Biochemical Lignocellulose Conversion*. Fall 2009-present

#### **MS Students**

Caroline Häggström Chemical Engineering, Luleå University of Technology. Thesis: *Media requirements for aerobic cultivation of *Saccharomyces cerevisiae* TMB3400F-30-3 on softwood hydrolyzate*. June 2008

Jonas Vinblad von Walter Chemical Engineering, Luleå University of Technology. Thesis: *Integration of Alkaline Hemicellulose Extraction into a Kraft Pulp Mill*. Aug 2007

#### **Other Researchers**

Tongjun Liu **Visiting Scholar**, Associate Professor, College of Food and Bioengineering, Shandong Institute of Light Industry, Jinan, China. July 2009-present

Jonas Helmerius **Research Engineer**, Luleå University of Technology. Extraction and characterization of birch xylan; Bacterial fermentations; Biomass and hydrolyzate characterization; Hydrolyzate detoxification. Jan 2007 – Oct 2008

#### **Undergraduate Students**

Phil Lehman **Undergraduate Researcher**, Chemical Engineering, Michigan State University, June 2009-August 2009

Marc Hansen **Undergraduate Researcher**, Chemical Engineering, Michigan State University, Sept 2009-present

- Ana Vočina      **Leonardo Research Exchange Student**, Luleå University of Technology and the University of Ljubljana, Slovenia. Alkaline extraction of xylose from birch and distillers dried grain (DDG); *Gluconobacter oxydans* xylonic acid fermentation of alkali-extracted birch xylan. Sept – Dec 2006
- Michael Ware      **NSF Research Experience for Undergraduates (REU) Student**, Colorado State University, *Zymomonas mobilis* continuous culture ethanol fermentation from glucose and xylose. Summer 2003

### **Publications**

1. Rova U, Hodge DB (in preparation). Combined mRNA and Enzyme Expression Analysis for Glucose and Xylose Catabolism in *Escherichia coli* Metabolically Engineered for Succinic Acid Production.
2. Hodge DB, Häggström C, Rova U, Brandberg T (in preparation). Media Requirements for Aerobic Cultivation of *Saccharomyces cerevisiae* TMB 3400-F30-3 on Softwood Dilute Acid Hydrolyzate. *App Biochem Biotechnol*.
3. Enman J, Hodge DB, Berglund KA, Rova U (under review 2009). Growth promotive conditions for enhanced eritadenine production during submerged cultivation of *Lentinus edodes*. *J Biomed Biotechnol*.
4. Helmerius J, Vinblad von Walter J, Rova U, Berglund KA, Hodge DB (under review 2009). Impact of Hemicellulose Pre-extraction on the Properties of Birch Kraft Fibers. *Biores Technol*.
5. Hodge DB, Andersson CA, Berglund KA, Rova U (2009). Detoxification Requirements for Bioconversion of Softwood Dilute Acid Hydrolyzates to Succinic Acid. *Enz Microb Technol*. 44:309-316.
6. Andersson CA, Helmerius J, Hodge DB, Berglund K, Rova U (2009). Inhibition of Succinic Acid Production in Metabolically Engineered *Escherichia coli* by Neutralizing Agent, Organic Acids, and Osmolarity. *Biotech Prog*. 25(1):116-123.
7. Hodge DB, Karim MN, Schell DJ, McMillan JD (2009). Model-Based Fed-Batch for High-Solids Enzymatic Cellulose Hydrolysis. *Appl Biochem Biotech*. 152(1):88-107.
8. Hodge DB, Karim MN, Schell DJ, McMillan JD (2008). Soluble and Insoluble Solids Contributions to High-Solids Enzymatic Hydrolysis of Lignocellulose. *Biores Technol*. 99(18):8940-8948.
9. Enman J, Hodge DB, Berglund K, Rova U (2008). Production of the Bioactive Compound Eritadenine by Submerged Cultivation of Shiitake (*Lentinus edodes*) Mycelia. *J Ag Food Chem*. 56(8):2609–2612.
10. Andersson CA, Hodge DB, Berglund KA, Rova U (2007). Effect of Different Carbon Sources on the Production of Succinic Acid Using Metabolically Engineered *Escherichia coli*. *Biotech Prog*. 23(2):381-388.
11. Karim NM, Hodge DB, Simon L (2003). Data-Based Modeling and Analysis of Bioprocesses: Some Real Experiences. *Biotech Prog* 19(5):1591-1605.
12. Hodge DB and Karim MN (2002). Modeling and Advanced Control of Recombinant *Zymomonas mobilis* Fed-Batch Fermentation. *Biotech Prog* 18(3):572-579.

### **Book Chapters**

1. Berglund KA, Rova U, Hodge DB (in press 2009). Microbial metabolites as building blocks for renewable resource based surfactants. In: *Surfactants from Renewable Resources*. M. Kjellin, Ed. John Wiley & Sons.

### **Conference Presentations**

1. Williams DL\* and Hodge DB (2009). Mass Transfer Limitations of Enzymatic Hydrolysis of Cellulose at High Insoluble Solids Concentrations. AIChE National Conference, Nov. 8-12, Nashville, Tennessee.
2. Stoklosa RJ\* and Hodge DB (2009). Alkaline Hemicellulose Extraction and Solubility-Based Separation From Hardwoods. AIChE National Conference, Nov. 8-12, Nashville, Tennessee.
3. Hodge DB\*, Häggström C, Rova U, Brandberg T (2009). Media Requirements for Aerobic Cultivation of *Saccharomyces cerevisiae* TMB 3400-F30-3 on Undetoxified Softwood Dilute Acid Hydrolyzate. AIChE National Conference, Nov. 8-12, Nashville, Tennessee.
4. Hodge DB\*, Helmerius J, Vinblad von Walter J, Lindström C, Rova U (2009). Impact of Hemicellulose Pre-Extraction for Bioconversion On Birch Kraft Pulp Properties. AIChE National Conference, Nov. 8-12, Nashville, Tennessee.

5. Haggström C, Rova U, Brandberg T, Hodge D\* (2009). Media Requirements for Aerobic Cultivation of *Saccharomyces cerevisiae* TMB 3400-F30-3 on Undetoxified Softwood Dilute Acid Hydrolyzate. 31<sup>st</sup> Symposium on Biotechnology for Fuels and Chemicals, May 1-5, San Francisco, California.
6. Hodge DB\* (2009). Separations for Biorefining of Woody Biomass. Poster, Consortium for Plant Biotechnology Research Annual Conference, Feb. 9, Washington, D.C.
7. Hodge DB\*, Andersson CA, Berglund KA, Rova U (2008). Succinic Acid Production from Forest Based Raw Materials. Poster, 30<sup>th</sup> Symposium on Biotechnology for Fuels and Chemicals, May 4-7, New Orleans, Louisiana.
8. Andersson CA\*, Helmerius J, Hodge DB, Berglund KA, Rova U (2008). Effects of Neutralizing agent, organic acids, and osmolarity on succinic acid production by *Escherichia coli* AFP184. Poster, 30<sup>th</sup> Symposium on Biotechnology for Fuels and Chemicals, May 4-7, New Orleans, Louisiana.
9. Helmerius J\*, Vinblad von Walter J, Rova U, Berglund KA, Hodge DB (2008). Production of Value Added Chemicals from Xylan Extraction in a Kraft Pulp Mill and the Effect on Pulp Quality. Poster, 30<sup>th</sup> Symposium on Biotechnology for Fuels and Chemicals, May 4-7, New Orleans, Louisiana.
10. Helmerius J\*, Vinblad von Walter J, Rova U, Berglund KA, Hodge DB (2008). Production of Value Added Chemicals from Xylan Extraction in a Kraft Pulp Mill and the Effect on Pulp Quality. Nordic Wood Biorefinery Conference, March 11-13, Stockholm, Sweden.
11. Hodge DB\*, Helmerius J, Vinblad von Walter J, Lindström C, Rova U, Berglund KA (2007). Succinic acid production from forest based raw materials. Oral Presentation, STFI 4<sup>th</sup> Pulp and Paper Chemical Analysis Seminar, Sept 10-11, Stockholm, Sweden.
12. Hodge DB, Rova U\*, Berglund KA (2007). Succinic acid production as an integral component of a forest products biorefinery. Oral Presentation, 10<sup>th</sup> International Congress on Biotechnology in the Pulp and Paper Industry, June 10-15, Madison, Wisconsin.
13. Hodge DB\*, Helmerius J, Rova U, Berglund KA (2007). Succinic Acid Production from Forest-Based Feedstocks. Poster, 29<sup>th</sup> Symposium on Biotechnology for Fuels and Chemicals, April 29–May 2, Denver, Colorado.
14. Hodge DB\*, Andersson CA, Rova U, Berglund KA. (2006). Succinic Acid Production from Industrial Feedstocks by Metabolically Engineered *Escherichia coli*. Poster, Biomass-Derived Pentoses: from Biotechnology to Fine Chemistry, 22-25 October, Reims, France.
15. Hodge DB\*, Schell DJ, McMillan JD (2006). Factors Affecting Enzymatic Hydrolysis of Dilute Acid Pretreated Corn Stover Slurries. Poster, 28<sup>th</sup> Symposium on Biotechnology for Fuels and Chemicals, April 30–May 3, Nashville, Tennessee.
16. Hodge DB, Karim MN\*, Schell DJ, McMillan JD (2005). Control of High-Solids Saccharification using a Model-Based Methodology for Fed-Batch Operation, Oral Presentation, European Control Conference, Dec. 12-15, Seville, Spain.
17. Hodge DB\*, Karim MN, Farmer J, Schell DJ, McMillan JD (2005). High-Solids Enzymatic Saccharification of Cellulose, Poster, 27<sup>th</sup> Symposium on Biotechnology for Fuels and Chemicals, May 1-4, Denver, Colorado.
18. Hodge DB\*, Mohagheghi A, Baker JO, Schell DJ, McMillan JD (2005). Factors Affecting Scale-up of High Solids Saccharification from Shake Flasks to Stirred Tank Reactors, Poster, 27<sup>th</sup> Symposium on Biotechnology for Fuels and Chemicals, May 1-4, Denver, Colorado.
19. Hodge DB\*, Mohagheghi A, Schell DJ, Karim MN, McMillan JD (2004). A Fed-Batch Approach to Enable High-Solids Enzymatic Saccharification of Cellulose. Oral Presentation, AIChE Annual Meeting, Nov. 7-12, Austin, Texas.
20. Hodge DB, Karim MN\* (2004). Clustering Algorithms for 2-D PAGE Dynamic Protein Expression Profiles. Oral Presentation, 9<sup>th</sup> Symposium on Computer Applications in Biotechnology, March 28-31, Nancy, France.
21. Hodge DB, Hernández-Soto A, Karim MN\* (2003). Bottlenecks in Ethanol Production from Renewable Resources by a Metabolically Engineered Microorganism. Oral Presentation, International Conference on Chemical Engineering, December 29-30. Dhaka, Bangladesh.
22. Hodge DB, Reardon KF, Karim MN\* (2003). Data Analysis of Proteome Expression in Metabolically Engineered *Zymomonas mobilis*. Poster, AIChE Annual Meeting, San Francisco, California.
23. Hodge DB\*, Reardon KF, Karim MN (2003). Proteome Expression Analysis of the Consequences of Metabolic Engineering in *Zymomonas mobilis* C25. Poster, 25<sup>th</sup> Symposium on Biotechnology for Fuels and Chemicals, May 4-7, Breckenridge, Colorado.

24. Hodge DB\*, Reardon KF, Karim MN (2003). Application of Hierarchical Cluster Analysis to Detect Coordinated Protein Expression in Metabolically Engineered *Zymomonas mobilis*, Oral Presentation, American Control Conference, June 4-6, Denver, Colorado.
  25. Hodge DB\*, Simon L, Karim MN (2003). Data Driven Approaches to Modeling and Analysis of Batch Biochemical Reactors, Oral Presentation, American Control Conference, June 4-6, Denver, Colorado.
  26. Hodge DB\*, Reardon KF, and Karim MN (2002). Proteome Expression Analysis of the Consequences of Metabolic Engineering in *Zymomonas mobilis*, Oral Presentation, AIChE Annual Meeting, Nov. 3-8, Indianapolis, Indiana.
  27. Hodge DB and Karim MN\* (2002). Nonlinear MPC for Recombinant *Zymomonas mobilis* Fed-Batch Ethanol Fermentation, Oral Presentation, 15<sup>th</sup> IFAC World Congress, July 21-26, Barcelona, Spain.
  28. Hodge DB\* and Karim MN (2002). Nonlinear MPC for Optimization of Recombinant *Zymomonas mobilis* Fed-Batch Fermentation, Oral Presentation, American Control Conference, May 8-10, Anchorage, Alaska.
  29. Hodge DB\* and Karim MN (2001). Modeling and Predictive Control of Recombinant *Zymomonas mobilis* Fed-Batch Fermentation, Presentation, Oral Presentation, AIChE Annual Meeting, Nov. 4-9, Reno, Nevada.
  30. Hodge DB\* and Karim MN (2001). Hybrid Neural Model for State Estimation and Kinetic Rate Prediction for Recombinant *Zymomonas mobilis* Fermentation, Poster, 23<sup>rd</sup> Symposium on Biotechnology for Fuels and Chemicals, May 6-9, Breckenridge, Colorado.
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\* indicates the presenter