Biographical Sketch – Laura R. Jarboe

Professional preparation

University of Kentucky	Chemical Engineering	B.S.	2000
University of California, Los Angeles	Chemical and Biomolecular Engineering	Ph.D.	2006
University of Florida	Microbiology and Cell Science (Ingram)	2006-2008	

Appointments

2014 – 2016, Associate Chair Interdepartmental Microbiology Program, Iowa State University
2013 – 2014, Karen and Denny Vaughn Faculty Fellow, ISU
2012 – present, member of Toxicology Interdepartmental Program, ISU
2010 – present, member of Bioinformatics & Computational Biology Program, ISU
2008 – present, member of Interdepartmental Microbiology Program, ISU
2008 – 2014, Assistant Professor, Chemical and Biological Engineering, Iowa State University

Publications

2014

X. Liang, M. Soupir*, S. Rigby, L. Jarboe, W. Zhang. "Flow cytometry is a promising and rapid method for differentiating between freely suspended E. coli and E. coli attached to clay particles" *submitted to* Applied Microbiology, 2014

T.J. Claypool, D.R. Raman, **L.R. Jarboe**, D.R Nielsen. "Technoeconomic evaluation of Bio-Based Styrene production by Engineered *Escherichia coli*" Journal of Industrial Microbiology and Biotechnology, 2014, 41(8):1211-6 DOI 10.1007/s10295-014-1469-5

L.A. Royce, E. Boggess, Y. Fu, P. Liu, J.V. Shanks, J. Dickerson, **L. Jarboe**. "Transcriptomic analysis of carboxylic acid challenge in *Escherichia coli*: beyond membrane damage" PLOS ONE 2014, 9(2):e89580 doi:10.1371/journal.pone.0089580

A.L. Teh, D. Layton, D.R. Hyduke, L. Jarboe, D.K. Rollins, Sr. "Data Mining Based on Principal Component Analysis: Application to the Nitric Oxide Response in Escherichia coli" Journal of Statistical Science and Application 2:1-18 (2014)

2013

Z. Chi, M. Rover, E. Jun, M. Deaton, P. Johnston, R.C. Brown, Z. Wen, **L.R. Jarboe***, "Overliming detoxification of pyrolytic sugar syrup for direct fermentation of levoglucosan to ethanol" Bioresource Technology 2013 150:220-227.
http://dx.doi.org/10.1016/j.biortech.2013.09.138

L. R. Jarboe*, L.A. Royce, P. Liu "Understanding biocatalyst inhibition by carboxylic acids" Frontiers in Microbiology 2013 4:272 doi:10.3389/fmicb.2013.00272
http://www.frontiersin.org/Microbial_Physiology_and_Metabolism/10.3389/fmicb.2013.00272/full

X. Zhao, Z. Chi, M. Rover, R. Brown, **L. Jarboe**, Z. Wen* "Microalgae Fermentation of Acetic Acid-Rich Pyrolytic Bio-oil: Reducing Bio-Oil Toxicity by Alkali Treatment" Environmental Progress & Sustainable Energy 2013 32:955 DOI 10.1002/ep.11813

L.A. Royce, P. Liu, M.J. Stebbins, B.C. Hanson, **L.R. Jarboe*** "The damaging effects of short-chain fatty acids on *Escherichia coli* membranes" Applied Microbiology and Biotechnology 2013 97:8317 DOI 10.1007/s00253-013-5113-5
http://link.springer.com/article/10.1007%2Fs00253-013-5113-5

L. Jarboe*, Z. Chi "Inhibition of microbial biocatalysts by biomass-derived aldehydes and methods for engineering tolerance" pp 101-120 New Developments in Aldehydes Research 2013. ISBN #978-1-62417-090-4.

Y. Liang, X. Zhao, Z. Chi, M. Rover, P. Johnston, R. Brown, **L. Jarboe**, Z. Wen* "Utilization of acetic acid-rich pyrolytic bio-oil by microalga *Chlamydomonas reinhardtii*: Reducing bio-oil toxicity and enhancing algal toxicity tolerance" Bioresource Technology 2013 133:500 – 506.
http://dx.doi.org/10.1016/j.biortech.2013.01.134

L.A. Royce, E. Boggess, T. Jin, J. Dickerson, **L. Jarboe***. "Identification of Mutations in Evolved Bacterial Genomes" *Methods in Molecular Biology* (vol 985): *Systems Metabolic Engineering: Methods and Protocols*, Hal Alper (ed). 2013
http://dx.doi.org/10.1007/978-1-62703-299-5

P. Liu, A. Chernyshov, T. Najdi, Y. Fu, J. Dickerson, S. Sandmeyer, **L. Jarboe*** "Membrane stress caused by octanoic acid in *Saccharomyces cerevisiae*" Applied Microbiology and Biotechnology 2013 97(7):3239-3251 10.1007/s00253-013-4773-5
http://link.springer.com/article/10.1007%2Fs00253-013-4773-5

K. B. Kautharapu, J. Rathmacher, **L. Jarboe*** "Growth condition optimization for docosahexaenoic acid (DHA) production by *Moritella marina* MP-1" Applied Microbiology and Biotechnology 2013 97(7):2859-2866 DOI: 10.1007/s00253-012-4529-7
http://www.springerlink.com/content/n37573r377502523/

2012

P. Liu, L. Jarboe* "Metabolic Engineering of biocatalysts for carboxylic acids production" Computational and Structural Biology 2012. 3(4) e201210011,
http://dx.doi.org/10.5936/csbj.201210011

L. Jarboe*, P. Liu, K. Kautharapu, L.O. Ingram "Optimization of enzyme parameters for fermentative production of biorenewable fuels and chemicals" Computational and Structural Biotechnology Journal. October 2012. 3(4) e201210005,
http://dx.doi.org/10.5936/csbj.201210005

K.B. Kautharapu, **L. Jarboe***, "Genome sequence of psychrophilic deep sea bacterium *Moritella marina* MP-1" Journal of Bacteriology, November 2012. 194:6296-6297.
http://jb.asm.org/cgi/content/abstract/194/22/6296?etoc

2011

P.C. Turner, L.P. Yomano, **L.R. Jarboe**, S.W. York, C.L. Baggett, B.E. Moritz, E.B. Zentz, K.T. Shanmugam, L.O. Ingram*. "Optimal mapping and sequencing of the *Escherichia coli* KO11

genome reveal extensive chromosomal rearrangements and multiple tandem copies of the *Zymomonas mobilis pdc* and *adhB* genes" J Ind Micro Biotech. 2011. 39(4):629-639.

L. R. Jarboe*, P. Liu, L. Royce "Engineering inhibitor tolerance for the production of biorenewable fuels and chemicals". Current Opinion in Chemical Engineering. 2011 (invited) 1:38-42. DOI 10.1016/j.coche.2011.08.003
http://www.sciencedirect.com/science/article/pii/S2211339811000086

P. Liu, M.L. Soupir, M. Zwonitzer, B. Huss, **L. Jarboe*** "Antibiotic Resistance in Agricultural *E. coli* Isolates is Associated with Attachment to Quartz" *AEM*. 2011. 77(19):6945-6953. **doi:10.1128/AEM.00717-11**

L. R. Jarboe*, Z. Wen, D.W. Choi, R.C. Brown "Hybrid thermochemical processing: fermentation of pyrolysis-derived bio-oil". Applied Microbiology and Biotechnology. 2011 (invited) 91(6):1519-1523. **10.1007/s00253-011-3495-9**
http://www.springerlink.com/openurl.asp?genre=article&id=doi:10.1007/s00253-011-3495-9

D. Layton, A. Ajjarapu, D.W. Choi, **L. Jarboe***. "Engineering ethanologenic *Escherichia coli* for levoglucosan utilization". *Bioresource Technology*. 2011 **102**:8318-8322.
http://dx.doi.org/10.1016/j.biortech.2011.06.011

Y. Fu, **L.R. Jarboe**, J. Dickerson*. "Reconstructing genome-wide regulatory network of *E. coli* using transcriptome data and predicted transcription factor activities". *BMC Bioinformatics*. 2011 **12**:233. http://www.biomedcentral.com/1471-2105/12/233

2010

L.R. Jarboe* 2010. "YqhD: A broad-substrate range aldehyde reductase with various applications in production of biorenewable fuels and chemical" *Applied Microbiology and Biotechnology*. 89(2):249. http://www.springerlink.com/content/hl27146115318760/

P.C. Turner, E.N. Miller, **L. Jarboe**, C.L. Baggett, K.T. Shanmugam, L.O. Ingram*. YqhC regulates transcription of the adjacent *Escherichia coli* genes *yqhD* and *dkgA* that are involved in furfural tolerance. *J Industr Microbiol Biotechnol.* **38**:431. 2011.
DOI 10.1007/s10295-010-0787-5 http://www.springerlink.com/content/d003u8203g763005/

E.N. Miller, P.C. Turner, **L.R. Jarboe**, L.O. Ingram.* 2010. Genetic changes that increase 5-hydroxymethyl furfural resistance in ethanol-producing Escherichia coli LY180. *Biotechnology Letters*. 32(5):661-667. http://www.springerlink.com/content/l147081327744512/

L. R. Jarboe, X. Zhang, X. Wang, J.C. Moore, K.T. Shanmugam, L.O. Ingram*. 2010. Metabolic engineering for production of biorenewable fuels and chemicals: contributions of synthetic biology *(invited) Journal of Biomedicine and Biotechnology.* Article ID 761042
http://www.hindawi.com/journals/jbb/2010/761042.html

2009

Zhang, X., K. Jantama, J.C. Moore, **L. Jarboe**, K.T. Shanmugam, L.O. Ingram*. 2009. Metabolic Evolution of energy-conserving pathways for succinate production in *Escherichia coli. Proceedings of the National Academy of Sciences, USA*. 106(48):20180-20185.
http://www.pnas.org/content/106/48/20180

Miller, E.N., **L.R. Jarboe**, P.C. Turner, P. Pharkya,L.P. Yomano, S.W. York, K.T. Shanmugam, L.O. Ingram.* 2009. Furfural Inhibits Growth by Limiting Sulfur Assimilation in Ethanologenic *Escherichia coli* strain LY180. *Applied and Environmental Microbiology* 75(19):6132-6141.
http://aem.asm.org/cgi/content/full/75/19/6132

Jarboe L.R., D.R. Hyduke, J.C. Liao*. 2009. "Systems Approaches to Unraveling Nitric Oxide Response Networks in Prokaryotes". Nitric Oxide (2nd Ed) Ed. L. Ignarro. Elsevier.
not available online

Miller, E.N., **L.R. Jarboe**, L.P. Yomano, S.W. York, K.T. Shanmugam, L.O. Ingram*. 2009. Silencing of NADPH-dependent Oxidoreductases (*yqhD* and *dkgA*) in Furfural-Resistant Ethanologenic *Escherichia coli*. *Applied and Environmental Microbiology* 75(13):4315-4323.
http://aem.asm.org/cgi/content/full/75/13/4315

2008

Jarboe, L.R.[1], D.R. Hyduke[1], L.M. Tran, K.J.Y Chou and J.C. Liao. 2008. Determination of the *Escherichia coli* S-nitrosoglutathione response network using integrated biochemical and systems analysis. *Journal of Biological Chemistry* 283(8):5148-5157. [1]co-first authors
http://www.jbc.org/cgi/content/full/280/11/10065

2007

Jarboe, L.R., T.B. Grabar, L.P. Yomano, K.T. Shanmugam L.O. Ingram*. 2007. "Development of Ethanologenic Bacteria" Advances in Biochemical Engineering: Biofuels. Ed. L. Olsson. Springer. http://www.springerlink.com/content/w34780x4t1gxrp55/

Hyduke, D.R[1]., **L.R. Jarboe**[1], L.M. Tran, K.C. Chou and J.C. Liao*. 2007. Integrated network analysis identifies nitric oxide response networks and dihydroxyacid dehydratase as a crucial target in *Escherichia coli*" *PNAS* 104(20):8484-8489. [1]co-first authors
http://www.pnas.org/content/104/20/8484

2005

Zhou, B., D. Beckwith, **L.R. Jarboe** and J.C. Liao*. 2005. Markov Chain Modeling of Pyelonephritis-Associated Pili Expression in Uropathogenic *Escherichia coli*. *Biophysical Journal* 88(4):2541-2553. http://www.cell.com/biophysj/abstract/S0006-3495(05)73309-9

2004

Jarboe, L.R., D. Beckwith and J.C. Liao*. 2004. Stochastic Modeling of the Phase-Variable *pap* Operon Regulation in Uropathogenic *Escherichia coli*. *Biotechnology and Bioengineering* 88(2):189-203. http://www3.interscience.wiley.com/cgi-bin/fulltext/109658796/PDFSTART

Formally Invited Lectures and Invited Conference Presentations

"Identifying and Addressing Mechanisms of Biocatalyst Inhibition by Short-Chain Carboxylic Acids" Society of Industrial Microbiology and Biotechnology Annual Meeting, San Diego, CA. 8/15/2013.

"Overcoming Biocatalyst Inhibition for Robust Production of Biorenewable Fuels and Chemicals" Frontiers in Biorefining, St Simon's Island, GA. 11/1/2012.

"Overcoming Biocatalyst Inhibition for Robust Production of Biorenewable Fuels and Chemicals" University of Maryland, College Park. 9/12/2012.

"Engineering Inhibitor-Tolerant Bacterial Biocatalysts" University of Iowa, Iowa City, Iowa, 11/2/2011.

"Biocatalyst Engineering for Inhibitor Tolerance" Symbiosis 4.0 Biotechnology Conference, Tecnológico de Monterrey, Monterrey, Mexico, 4/1/2011

"Strategies to Overcome Biocatalyst Inhibition", Division of Chemical Engineering, Pusan National University, Republic of South Korea, 6/12/2010

"Strategies to Overcome Biocatalyst Inhibition" in "Biochemistry for Engineers" course, Department of Chemical and Biological Engineering, Korea University, Republic of South Korea, 6/10/2010

"Engineering Bacterial Stress Response Networks" University of Northern Illinois Department of Biological Sciences, 10/15/2009

"Engineering Bacterial Stress Response Networks", University of Kentucky Department of Chemical Engineering and Materials Science, 9/15/2009

"Strategies to Overcome Biocatalyst Inhibition" SIM Annual Meeting, San Francisco, CA, Session 15, 8/3/2010

Iowa State University Biorenewables Intensive Program Lecture, "Chemical Production: Opportunities and Challenges" 6/12/2009

Offices Held in Professional Societies

American Institute of Chemical Engineers (AIChE), Member
Society for Industrial Microbiology and Biotechnology (SIMB), Member
American Chemical Society (ACS), Member
Iowa Academy of Sciences, Member

Synergistic activities

1. Research experience for Undergraduates, Young Engineers and K-12 Teachers:
   - ISU students (41), REU students (11), Young Engineers (2), RET (3)
2. Advisor for the Chemical Engineering Honor Society Omega Chi Epsilon at Iowa State University 2008 - 2011.

3. Advisor for Iowa State University Engineers Without Borders trip to Belize, March 2010, November 2010, November 2012
4. Designed and implemented a fermentation module for CBiRC RET program, summer 2009
5. Reviewer for

   - *ACS Synthetic Biology; ACS Chemical Reviews; ACS Sustainable Chemistry & Engineering; African Journal of Biotechnology; Applied and Environmental Microbiology; Applied Microbiology and Biotechnology; Biochemical Engineering Journal; Biomass and Bioengineering; Bioresource Technology; Biotechnology Advances; Biotechnology and Bioengineering; Biotechnology and Bioprocess Engineering; Biotechnology Journal; Biotechnology Progress*; *BMC Biotechnology; BMC Systems Biology; Chemical Engineering Science; Computational and Structural Biotechnology Journal; Energy & Fuels; Frontiers in Microbial Physiology and Metabolism; International Journal of Biological Sciences; Journal of Industrial Microbiology and Biotechnology; Journal of Theoretical Biology*; *Journal of Biomedicine and Biotechnology; Metabolic Engineering; Microbial Cell Factories; PLoS ONE; Process Biochemistry; Proteome Science; Trends in Biotechnology*.

   - NIH SBIR/STTR: 3/2011, 7/2011, 11/2011, 3/2012, 7/2012, 7/2013; DOE EPSCOR: 7/2011; DOE ARPA-E 7/2013; NSF BIO: 1/2012, 2/2013, 12/2013; NSF CBET: 5/2012, 4/2013; NSF PIRE: 6/2012; NSF SBIR 2/2013, 8/2013.
6. Session (co-)chair for Society for Industrial Microbiology and Biotechnology (2009, 2010, 2011, 2012, 2013); American Institute of Chemical Engineers (2009, 2010, 2011, 2012); Frontiers in Biorefining (2012).
7. Designed and implemented half-day lab modules for under-represented middle school students, through Iowa State's Science Bound program (2008, 2010); one-hour lab modules for "Program for Women in Science" K12 program (2012, 2013); one-hour lab modules for "Office of Precollegiate Programs for Talented and Gifted" (2012, 2013)
8. Presented webinar "Metabolic Engineering of Microbes for the Production of Biorenewable Fuels and Chemicals" for community college and K12 teachers through the AgEnergy program. March 2013. http://agenergyia.org/webinars/
9. Presentation on "Metabolic Engineering of Microbes for the Production of Biorenewable Fuels and Chemicals" for community college biology teachers at Iowa Association of Community College Biology Teachers, 9/28/2013

Collaborations & Other Affiliations

Collaborators and Co-Editors

Jean-Paul Bacik (LANL), Xianglan Bai (ISU), Gregg Beckham (NREL), Robert Brown (ISU), Nancy DaSilva (UCI), Julie Dickerson (ISU), Daniel Hyduke (USU), Ramon Gonzalez (Rice), Jeffrey Klauda (UM), Cathy Logue (ISU), Costas Maranas (Penn State), David Nielsen (ASU), Basil Nikolau (ISU), Lisa Nolan (ISU), John A. Rathmacher (Metabolic Technologies, Inc), Raj Raman (ISU), Ka-Yiu San (Rice), Suzanne Sandmeyer (UCI), Brent Shanks (ISU), Jackie Shanks (ISU), Zengyi Shao (ISU), Martin Spalding (ISU), Michelle Soupir (ISU), Michael Thompson (ISU), Zhiyou Wen (ISU), Mark Mba Wright (ISU), Olga Zabotina (ISU), Shengde Zhou (NIU).

Graduate Advisors and Postdoctoral Sponsors

James C. Liao - University of California, Los Angeles

Biographical Sketch – Laura R. Jarboe

Lonnie O. Ingram - University of Florida

Thesis Advisor and Postgraduate-Scholar Sponsors

PhD Advisees (5)

2008 – 2013	Liam Royce (Chemical and Biological Engineering)
2009 – 2013	Ping Liu (Microbiology)
2011 – present	Tao Jin (Chemical and Biological Engineering)
2012 – present	Chunyu Liao (Microbiology)
2013 – present	Yingxi Chen (Chemical and Biological Engineering)

M.S. Advisees (1)

2008 – 2010	Martha Zwonitzer (Environmental Science)

Postgraduate-Scholars (3)

2010 – 2013	Kumar Babu Kautharapu
2011 – 2014	Zhanyou Chi
2013 – present	Jieni Lian