CURRICULUM VITAE

X. Margaret Liu, Ph.D.

Associate Professor
Department of Biomedical Engineering, School of Engineering, The University of Alabama at Birmingham

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RANK/TITLE

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EDUCATION

Year	Degree	Institution
2005	Ph.D. Chemical & Biomolecular Eng.	The Ohio State University
2000	M.S. Biochemical Engineering	Tianjin University
1997	B.S. Chemical Engineering	Shandong University
1997	B.S. Computer Science & Eng. (Minor)	Shandong University

EMPLOYMENT

2016-	Associate Professor, Department of biomedical Engineering, School of Engineering The University of Alabama at Birmingham, Birmingham, AL
2012-2016	Assistant Professor, Department of Chemical and Biological Engineering Adjunct Assistant Professor, Department of Biological Science The University of Alabama, Tuscaloosa, AL
2007-2011	Sr. Scientist, Project and R&D Lead, Cell Culture and Cell Line, PD-Direct Department, Life Technologies, Frederick, MD
2006-2007	Engineer, Project and Team Leader, Cell Culture Process Development Lonza, Baltimore, MD
2005-2006	Scientist, Cell Culture Process Development EMD Pharmaceuticals Inc. (Merck KGaA), Billerica, MA

HONORS AND AWARDS

2016	Outstanding Faculty Award, University of Alabama, Tuscaloosa, AL
2015	Reichhold-Shumaker Professorship, University of Alabama, Tuscaloosa, AL
2015	RGC Level 2 Award, University of Alabama, Tuscaloosa, AL
2014	System Research Collaborative Award, University of Alabama, Tuscaloosa, AL
2012	RGC Level 1 Award, University of Alabama, Tuscaloosa, AL
2011	Life Technologies Bronze Award, Life Technologies, Frederick, MD
2010	R&D and NPI Excellent Award, Life Technologies, Frederick, MD

2010 R&D Excellence Award, Life Technologies, Frederick, MD
2010 R&D Excellence Award, Life Technologies, Frederick, MD
2008 New Idea Award, Life Technologies (Invitrogen), Frederick, MD
2008 R&D Excellence Award, Life Technologies (Invitrogen), Frederick, MD
2008 Customer Excellence Award, Life Technologies (Invitrogen), Frederick, MD
2005 Alumni Graduate Research and Scholarship, The Ohio State University, Columbus, OH
2005 Outstanding Graduate Student, The Ohio State University, Columbus, OH
2003-2004 CPBR Research Fellowship, The Ohio State University, Columbus, OH
2001-2002 Graduate Fellowship, The Ohio State University, Columbus, OH

PROFESSIONAL SOCIETIES AND MEMBERSHIPS:

2001- American Institute of Chemical Engineers (AIChE)
2003- American Chemical Society (ACS)
2016- Biomedical Engineering Society (BMES)

NATIONAL COUNCILS AND COMMITTEES

2012- Chair of oral and poster sessions, AIChE annual meeting, Division 15 Food, Pharmaceutical, and Bioprocessing Engineering, Call for paper, review and select abstract, and chair multiple sessions

2014-2015 Program chair (director), AIChE annual meeting, Subdivision 15a and program co-chair of subdivision 15b, Established 4 sessions by collaborating with industry and University of Minnesota (2014)

2014-2015 Program co-chair, AIChE annual meeting, Created new “Topical - Sustainable Food Production” for divisions 15 and 12 by collaborating with University of Connecticut and University of California, Davis

2012 Chair of two sessions, International Bioenergy workshop, Review abstracts and chair sessions

2017 NSF BBE CBET Proposal Review Panel

EDITORIAL BOARD MEMBERSHIP

Editorial Board:

2013 Current Biotechnology
2012- Austin Biomedical Engineering
2012-2015 Journal of Biopharmaceutical Bioprocessing
2015- Journal of Biomedical Engineering and Bioinformatics
2015- Future Science Open
2015- Journal of China Chemical Engineering
2015- Journal of Biosimilars
2015- DovePress

Reviewer: American Journal of Oncology, Applied Biochemistry and Biotechnology, Biochemical Engineering, Bioprocess and Biosystems Engineering, Biotechnology for Biofuel, Biotechnology and Bioengineering, Biotechnology Journal, Cancer Letters, Chemical Engineering Journal, Chinese Journal of Chemical Engineering, Current Biotechnology, Current Medicinal Chemistry, Dover Medical Press, Electrophoresis, Energies, Environmental Science & Technology, International Journal of Hydrogen Energy, International Journal of Microbiology Research, International Journal of Nanomedicine, Journal of Biomedical Engineering and Bioinformatics, Journal of Biosimilars, Journal of

Biotechnology, Journal of industrial Microbiology and Biotechnology, Journal of Proteomics, MABS, Metabolic Engineering, Molecular Biotechnology, Molecular Biosystems, OncoTargets and Therapy, Process Biochemistry, The Open Biotechnology, Transport and Separation Processes

UNIVERSITY ACTIVITIES AND SERVICE

2016	Judge of oral presentation session, Southern AIChE conference, Tuscaloosa, AL
2015-2016	Seminar organizer, Department of Chemical and Biological Engineering, The University of Alabama, Invite and host departmental seminar speakers, organize their seminars and arrange their travel
2014-	Advisor, Omega Chia Epsilon (OXE), The University of Alabama, Advise the Tao chapter of OXE student organization by selecting members and meeting with members
2013-	Support the undergraduate recruitment, Meet with the prospective high school students and their family members, introduce the department, curriculum, and research, and answer their questions
2013-2014	Chair, Graduate Recruitment Committee, Department of Chemical and Biological Engineering (ChBE), The University of Alabama, Lead and support the graduate students recruiting work by attending BMES and AIChE graduate recruitment fairs, and recruit students from other universities
2013-2014	Member, Graduate Recruitment Committee, Department of Chemical and Biological Engineering (ChBE), The University of Alabama, Support the graduate students recruiting work by attending AIChE graduate recruitment fairs
2012-	Faculty member of UA NSF Research Experiences for Undergraduates (REU), The University of Alabama, Senior member of the REU proposal, mentor of eight REU students by advising students' research and conference presentations
2012-	Committee Chair/Member of Graduate Students, The University of Alabama, Served on the qualifying exam, pre-defense and final defense committee for 9 graduate students
2012-	Interviewer of multiple faculty candidates, Department of Chemical and Biological Engineering, The University of Alabama, Interview the faculty candidates

MAJOR RESEARCH INTERESTS

Biomedical Research - Novel targeting therapy development for cancer and heart failure treatment. One on-going project is to develop a cellular biomanufacturing platform to produce reliable and reproducible large quantities of human T cells (or CAR T cells) and engineer the T cells via understanding the intracellular metabolism using systems biology for immune cancer therapy. Collaborating with Surgery faculty, we also develop novel monoclonal antibody (mAb) for cancer treatment. Another project is to utilize advanced molecular biology and cell engineering techniques to develop stable cell lines expressing mitochondrial ChR2 and test the feasibility to precisely control mitochondria. Multiple human cancer cell lines are used to develop and evaluate the novel anti-cancer technology. In addition, my laboratory is also interested to develop and achieve a high-density and scalable cell culture process of undifferentiated iPSC cells as well as their differentiated progenies (such as cardiovascular cells) using stirred tank bioreactor for cellular therapy. In these projects, the unique systems biology-based metabolic cell-process engineering (MCPE) technology will be applied to understand and regulate cellular metabolism and identify key regulators of host cell and process.

Biopharmaceutical Research - Multi-Omics facilitated mammalian cell engineering for anti-cancer biopharmaceutical development. The goal is to express and produce anti-cancer biopharmaceuticals and other therapeutic proteins with high quality, stability and productivity by rational engineering of mammalian CHO. The multi-Omics technologies are used to develop an in-depth understanding of cellular metabolism and physiology by creating global protein map (proteomics) and

generating metabolic profiling (metabolomics). Targeting regulation and synthetic biology are applied to rationally engineer host cells to improve protein quality and productivity based on the integrated systems biology. Protein productivity is improved by designing specific production process through medium development and production parameters optimization. Taken together, novel biopharmaceutical platform with short timeline and high production efficiency will be developed to assist therapeutic protein development and commercialization.

Bioenergy Research - High Production of biochemical and biofuel using clostridia facilitated with rational metabolic cell-process engineering. We target to improve the production of bioenergy and biochemicals from cellulose biomass and green gas using various Clostridial microorganisms. The novel metabolic engineering technology, multi-Omics guided metabolic cell-process engineering, is applied to investigate the intracellular metabolism and global host cell protein expression. The proteomics and metabolomics data are integrated to rationally design the metabolic engineering strategy at both cell and bioprocessing levels to produce the targeted biochemicals.

TEACHING EXPERIENCES

2017 Spr	BME 490/590 Special Topics in Industrial Bioprocessing and Biomanufacturing, 3 hr.
2016 Sum	CHE 354 Chemical Reaction Engineering, 3 hr., Instructor, 19 undergraduate students
2016 Spr	CHE 551 Advanced Thermodynamics, 3 hr., Instructor, 11 graduate students
2015 Fal	CHE 492/592 Industrial Biotechnology and Biopharmaceutical, 3 hr., Instructor, 30 graduate and undergraduate students, designed by X. Liu
2015 Spr	CHE 321 Basic Chemical Engineering Unit Operation Laboratory, 2 hr., Instructor together with another faculty due to 2-month maternity leave, 120 students, 4 sessions
2014 Fal	CHE 304 Fluid Flow Operation, 3 hr., Instructor, 50 students
2014 Spr	CHE 319 Basic Chemical Engineering Unit Operation Laboratory, 2 hr., Instructor, 60 undergraduate students, 2 sessions
2014 Fal	CHE 325 Metabolic Engineering, 1 hr., Honors forum, co-instructor, 12 undergraduates
2012-2013&2014	CHE 491/498/598/698 Special Problem, 1-3 hr., Instructor, Research course CHE 445 Intro Biochemical Engineering, 3 hr., Guest lecture
2014 Fal	CHE 482 Chemical Process Design II, 3 hr., Guest lecture

GRANT SUPPORT

ACTIVE

NSF Biomedical Engineering (Liu, PI) 01/01/2017 - 12/31/2018
"EAGER: Biomanufacturing: Metabolic cell process engineering (MCPE)-based stirred-tank bioproduction of large quantities of human T cells"
Amount: $299,862
The objective of this project is to develop a cellular biomanufacturing platform to produce reliable and reproducible large quantities of human T cells for immune cancer therapy by combining our novel metabolic cell-process engineering technology and stirred-tank bioreactor production.

NIH/NHLBI R21HL127599 (Liu, co-I) 4/01/2016 - 3/31/2018
"A Novel Optogenetic Tool for Precise Mitochondrial Control"
Amount: direct cost of $290,306 and indirect cost
The goal of this project is to develop an innovative optogenetics-based tool to achieve precise control of mitochondria and study the differential role of mitochondrial inner membrane permeability in determining cell live or death.

DOE EERE DE-EE0007005 (Liu, co-PI) 10/01/2015 - 12/31/2017
"Engineering Clostridia for n-Butanol Production from Lignocellulosic Biomass and CO_2"
Amount: $299,891 for Liu Lab (total $1,544,433)
The goal of this project is to construct the metabolically engineered clostridia to produce butanol from both lignocellulose and CO_2, develop an integrated butanol production and separation process at bench top scale, and scale up to manufacturing by capitalizing on the advanced BEST fermentation process.

PENDING

DoD PRCRP (Liu, PI) 12/01/2016 - 11/31/2018 submitted on 09/13/2016
"Metabolic cell process engineering-based biomanufacturing of large quantities of human CAR-T cells for immune cancer treatment"
Amount: direct cost of $400,000 and indirect cost

NSF BME Liu PI) 08/15/2017 - 08/14/2020 submitted on 01/04/2017
"Rational Engineering of Biomanufacturing to Produce Large-Quantity and High-Quality Induced Pluripotent Stem Cells-Derived Cardiomyocytes for Myocardial Repair"

COMPLETED

NSF BRIGE EEC-1342390 (Liu, PI) 01/01/2014 - 12/31/2015
"Metabolic Cell-Process Engineering (MCPE) for High Biobutanol Production by *Clostridium tyrobutyricum*"
Amount: $174,629
The concept of Metabolic Cell-Process Engineering (MCPE) has been for the first time proposed. The goal is to conduct a feasibility study to develop the MCPE technology using proteomics and metabolite analysis, which has been used to improve biobutanol production by acidogenic *C. tyrobutyricum*.

UA RGC LEVEL 2 RG14657 (Liu, PI) 05/01/2015 - 04/30/2018
"Genome-Scale Model Guided Metabolic Engineering of *Clostridium tyrobutyricum* for Sustainable Biobutanol Production"
Amount: $88,446
The goal of this project is to construct a new-generation metabolically engineered clostridial strain via rational design by understanding the cellular metabolism and creating a novel genome-scale model.

PUBLICATION AND PATENT

PATENTS

1. Dempsey, J., Wu, F., **Liu, X.M.,** Ravnikar, P., Donahue-Hjelle, L., and Gorfien, S. Methods for Impacting Cell Metabolism in Cell Culture Media. LTC Docket No. LT00421 PRO, Serial No. 61/613,448, filed on March 20, 2013.
2. Slade, P., Hajivandi, M., Piras, G., **Liu, X.,** Koch, D., Hutanu, D., Bartel, C., Gorfien, S., Agnew, B. Secretome Monitoring Using Click Chemistry. Serial No. 61/492,290, filed on June 01, 2011.
3. Setterquist, R., Schageman, J., **Liu, X.M**. Cellular RNA Transcriptome Profiles. Serial No. 61/483,605, filed on May 06, 2011.

JOURNAL PAPERS AND BOOK CHAPTER (*corresponding author)

1. Yang, S.T. and Liu, X. Chapter 8. Metabolic Process Engineering for Biochemicals and Biofuels Production. New Biotechnologies for Increased Energy Security. CRC Press. Editor Juan Carlos Serrano-Ruiz. 2017. (**Book chapter**).

2. Xu, N., Liu, M., and **Liu, X.M.** Pharmacology, Pharmacokinetics, and Pharmacodynamics of Antibodies. Biosimilar. 2016. (**Book chapter**).
3. Ma, C., Ou, J., Xu, N., Yang, S.T., and **Liu, X.M.** Rebalancing Redox to Improve Biobutanol Production by *Clostridium tyrobutyricum*. Bioengineering. 3(2), doi: 10.3390/bioengineering3010002. 2016.
4. Xu, N., Ou, J., Gilani, A.K., Zhou, L., and **Liu, X.M.** High-Level Expression of Recombinant IgG1 by CHO K1 Platform. Frontiers of Chemical Science & Engineering. 9(3), 376-380. 2015.
5. Ma, C., Ou, J., McFann, S., Miller, M., **Liu, X.M.** High production of butyric acid by *Clostridium tyrobutyricum* mutant. Frontiers of Chemical Science & Engineering. DOI 10.1007/s11705-015-1525-3. 9(3) 369-375. 2015.
6. Chen, J., **Liu, X.,** Wie, D., and Chen, G. High yields of fatty acid and neutral lipid production from cassava bagasse hydrolysate (CBH) by heterotrophic *Chlorella protothecoides*. Bioresource Technology. 191: 281-290, 2015.
7. Ou, J., Ma, C., Xu, N., Du, Y., **Liu, X.M.** Review: High Butanol Production by Regulating Carbon, Redox and Energy in Clostridia. Frontiers of Chemical Science & Engineering. DOI 10.1007/s11705-015-1622-6. 9(3) 317-323. 2015.
8. Xu, N., Ma, C., Sun, W., Wu, Y., and **Liu, X.M.** Achievements and Perspectives in Host Cell Engineering. Pharmaceutical Bioprocessing. 3(4): 285-292. 2015.
9. Ma, C., Kojimab, K., Xu, N., Mobley, J., Zhou, L., Yang, S.T., and **Liu, X.M.** Comparative proteomics analysis of high n-butanol producing metabolically engineered *Clostridium tyrobutyricum*. Journal of Biotechnology. 193, 108-119. 2015
10. Sun, Y., Liu, N., Wang, Z., **Liu X.,** and Yu, L. Characterization of novel mixed-mode protein adsorbents fabricated from benzoyl-modified polyethyleneimine-grafted Sepharose. CHROMA. Journal of Chromatography. 1372, 157-165. 2014.
11. Zhou, L., Xu, N., Sun. Y. and **Liu, X.M.** Cancer Treatment Using Targeted Biopharmaceuticals. Cancer Letters. 352, 145-151. 2014.
12. **Liu, X.** and Zhou, L. The Application of Omics in Targeted Anticancer Biopharmaceuticals Development. Austin Journal of Biomedical Engineering. 1(1), 8-15. 2014.
13. Lu, C., Ma, C., and **Liu, X.** High-Productivity and Low-Cost Biobutanol Production by Integrated Process Development. International Journal of Innovative Research in Science & Engineering. 2(3). ISSN 2347-3207. 2014
14. Yang, S.T. and **Liu, X**. Metabolic Process Engineering for Biochemicals and Biofuels Production. Journal of Microbial and Biochemical Technology. 6(2), 1-4. 2014.
15. **Liu, X.**, Yang, S.T., and Zhou, L. The Application of Omics in Pharmaceutical Bioprocessing. Journal of Biopharmaceuticals Bioprocessing. 2(1), 1-4. 2014.
16. Yang, S.T. and **Liu, X.** Cell culture process for Biologics manufacturing: recent development and trends. Journal of Biopharmaceuticals Bioprocessing. 1(2), 133-136. 2013.
17. Lan, T., D. Wei., Yang, S.T., and **Liu, X.,** Enhanced production of lignocellulases by *Trichoderma viride* in a rotating fibrous bed bioreactor. Bioresource Technology. 133, 125-182. 2013.
18. Dong, W., Yang, S.T. and **Liu, X.** Butyric acid production from sugarcane bagasse hydrolysate by *Clostridium tyrobutyricum* immobilized in a fibrous-bed bioreactor. Bioresource Technology. 129, 553-560. 2013.
19. Dhulipala, P., Reddy, H., **Liu, X.M**., Shannon, B., Saubourin, M., Piras, G., Barrett, B., Hassett, R. and Gorfien, S. Media selection for successful limiting dilution cloning of CHO cells. BioProcess International. 2011.

20. Ravnikar, P., **Liu, X.M.,** Liu, J., Williams-Wright, T., and Wu, F. Novel cell lines for bioprocessing: friend or foe? ESACT Proceeding Paper. 2010.
21. **Liu, X.,** Liu, J., Williams, T., Lee, J., Lio, P., Donahue-Hjelle, L., Ravnikar, P. and Wu, F. Protein production improvement in fed-batch culture using high osmolarity resistant CHO cells. BioProcess International. 8(4), 68-76 (2010).
22. Alexander, P., Rudolph D., Underwood, S., Desai, S., and **Liu, X.** Optimizing microbial fermentation and mammalian cell culture: an overview. BioProcess International. 5(4), 16-24 (2007).
23. Yang, S., **Liu, X.,** Zhang, Y. Metabolic Engineering. p73-118, 2006. (**Book Chapter**).
24. **Liu, X.,** Yang, S.T. Kinetics of butyric acid fermentation of glucose and xylose by *Clostridium tyrobutyricum* wild type and mutant. Process Biochemistry. 41(4), 801-808 (2006).
25. **Liu, X.,** Zhu, Y., Yang, S.T. Construction and characterization of *ack* deleted mutant of *Clostridium tyrobutyricum* for enhanced butyric acid and hydrogen production. Biotechnology Progress. 22, 1265-1275 (2006).
26. **Liu, X.,** Zhu, Y., Yang, S.T. Butyric acid and hydrogen production by *Clostridium tyrobutyricum* ATCC 25755 and mutants. Enzyme Microbial Technology. 38, 521-528 (2005).
27. Zhu, Y., **Liu, X.,** Yang, S.T. Construction and characterization of *pta* gene deleted mutant of *Clostridium tyrobutyricum* for enhanced butyric acid fermentation. Biotechnology Bioengineering. 90, 154-166 (2005).
28. Dong, X., Wang, Y., **Liu, X.,** Y. Sun. Kinetic model of lysozyme renaturation with the molecular chaperone GroEL. Biotechnology Letter. 23, 1165-1169 (2001).
29. Dong, X., Bai, S., **Liu, X.,** Sun, Y. Kinetics of lysozyme refolding facilitated by molecular chaperone GroEL. Huagong Xuebao. 52, 1049-1053 (2001).
30. **Liu, X.,** Dong, X. Molecular chaperone and protein renaturation. Chem. Ind. Eng. 17, 120-124 (2000).
31. **Liu, X.,** Dong, X., Zhou, L., Wang, Y., Zeng, K., Sun, Y. Kinetics of lysozyme refolding assisted by chaperonin GroEL. Proceeding paper at National Conference on Chemical Engineering. 2000.
32. Zhou, L., Bai, S., **Liu, X**., Zhao, L., Xie, S., Sun, Y. Proceeding paper. 479-482 (2000).

PRESENTATIONS *(More than 50)*

1. Ma, C., Ou, J. and **Liu, X.M.** Biobutanol production by *C. tyrobutyricum* through proteomics guided carbon and redox rebalance. San Francisco, CA, AIChE, Nov 13-18, 2016. Oral.
2. Xu, N., Ma, C., Zhou, L. and **Liu, X.M.** Proteomics analysis of antibody producing CHO DG44 cell lines in different fed-batch processes. San Francisco, CA, AIChE, Nov 13-18, 2016. Oral.
3. Xu, N. and **Liu, X.M.** Glyco-engineering of CHO cells for improved protein quality. San Francisco, CA, AIChE, Nov 13-18, 2016. Oral.
4. Ou, J., Ma, C. and **Liu, X.M.** Process engineering of *Clostridium cellulovorans* for butanol production from biomass. San Francisco, CA, AIChE, Nov 13-18, 2016. Poster.
5. Ou, J., Ma, C. and **Liu, X.M.** Rationally metabolic engineering of *Clostridium cellulovorans* for butanol production. San Francisco, CA, AIChE, Nov 13-18, 2016. Oral.
6. Panian, J., Urli, J., Xu, N. and **Liu, X.M.** Improve CHO Cell Culture by adaptation and medium screening. Tuscaloosa, AL, AIChE Southern regional Conference. Mar 31 - Apr 2, 2016. Poster.
7. Leonard, K., Taglieri, M., Cooper, K., James, J., Xu, N. and **Liu, X.M.** High-yield stable CHO cell line development for mAb production. Mar 31 - Apr 2, 2016. Poster.
8. Xu, N., Yang, Y., and **Liu, X.M.** Comparative proteomic analysis of host and high biopharmaceuticals producing CHO cell lines. Salt Lake City, AIChE, Nov 8-13, 2015. Oral.

9. Xu, N., Ou, J., Zhou, L., and **Liu, X.M.** Analysis of post-translational regulation of engineered CHO using proteomics. Salt Lake City, AIChE, Nov 8-13, 2015. Poster.
10. Ou, J., Ma, C., and **Liu, X.M.** Omics guided rationally metabolic engineering of *Clostridium tyrobutyricum*. Salt Lake City, AIChE, 2015. Oral.
11. Ma, C., Ou, J., and **Liu, X.M.** Metabolic engineering of *C. tyrobutyricum* for high n-butanol production by rebalancing carbon and redox. Salt Lake City, AIChE, 2015. Poster.
12. Ma, C., Ou, J., and **Liu, X.M.** Analysis of amino acids metabolism in butanol fermentation by *Clostridium tyrobutyricum*. Salt Lake City, AIChE, Nov 8-13, 2015. Oral.
13. McFann, S., Mathews, L., Mayhugh, C., Robinson, J., Ma, C., and **Liu, M.** Constraint-based metabolic model elucidates energy, reducing power, and carbon flux distribution in *Clostridium tyrobutyricum* for optimization of n-butanol production. Salt Lake City, AIChE, Nov 7-9, 2015. Poster.
14. Mathews, L., Dietrich, C., Leffler, M., Smith, W., Ma, C., and **Liu, M.** Process optimization to improve butyric acid production with *Clostridium tyrobutyricum*. Salt Lake City, AIChE, Nov 7-9, 2015. Poster.
15. Miller, M., Ou, J., Ma, C. and **Liu, X.M**. Metabolic and process engineering of *Clostridium tyrobutyricum* for the optimization of butanol production. Salt Lake City, AIChE, Nov 7-9, 2015. Poster.
16. Ma, C., and **Liu, X.M.** 2014. Comparative Proteomics Analysis of High Butyrate and butanol producing *Clostridium tyrobutyricum* mutants. AIChE. Atlanta, Nov 16-21. Oral.
17. Ma, C., Xu, N., and **Liu, X.M.** 2014. Improve biobutanol production by integrated carbon and redox rebalance in *Clostridium tyrobutyricum*. AIChE. Atlanta, Nov 16-21. Oral.
18. Ma, C., Yang, S.T., and **Liu, X.M.** 2014. Genomic and proteomic analysis to characterize butyric acid fermentation by metabolically engineered *Clostridium tyrobutyricum*. AIChE. Atlanta, Nov 16-21. Oral.
19. Ma, C., Yang, S.T., and **Liu, X.M.** 2014. How to increase butanol production by metabolic cell-process engineering of *Clostridium tyrobutyricum*? AIChE. Atlanta, Nov 16-21. Poster.
20. Xu, N., and **Liu, X.M.** 2014. Characterization of protein expression regulators in different CHO hosts by global proteomics analysis. AIChE. Atlanta, Nov 16-21. Oral.
21. Sun, W, Ma, C., and **Liu, X.M.** 2014. Butanol production improvement by metabolically engineered *Clostridium tyrobutyricum* with proteomics analysis. AIChE. Atlanta, Nov 15-17. Poster.
22. Facchine, E., Panian, J., Urli, J., Crumbley, A., Steadman, M., Xu, N., and **Liu, X.M.** 2014. CHO platform evaluation for biopharmaceuticals production. AIChE. Atlanta, Nov 16-21.
23. Solai, K., Ma, C., and **Liu, X.M.** 2014. Process engineering of *Clostridium tyrobutyricum* to improve butyric acid production. AIChE. Atlanta, Nov 16-21.
24. Lind, R., Ma, C. and **Liu, X.** 2014. Butanol Production improvement by metabolically engineered *Clostridium tyrobutyricum* ATCC 25755. AIChE. Puerto Rico, Mar 21-23.
25. Ma, C., Xu, N., and **Liu, X.M.** 2013. Application of Omics technologies in n-biobutanol production by metabolically engineered *C. tyrobutyricum*. AIChE. San Francisco, CA, Nov 03-08.
26. Xu, N., Ma, C., and **Liu, X.M.** 2013. Proteomics: mechanism of biosimilar quality regulation in three CHO host cells. AIChE. San Francisco, CA, Nov 03-08.
27. Artale, B., Ma, C., and **Liu, X.M.** 2013. Metabolic engineering of *Clostridium tyrobutyricum* to improve biofuel production by boosting reducing power. AIChE. San Francisco, CA, Nov 03-08.
28. Parcher, E., Ma, C., and **Liu, X.M.** 2013. Biobutanol production from *Clostridium tyrobutyricum* by integrating metabolic engineering and process development. AIChE. San Francisco, CA, Nov 03-08.
29. Ma, C. and **Liu, X.M.** 2013. Metabolic engineering of *C. tyrobutyricum* - balance butyric acid and butanol. ACS. New Orleans, Apr 7-12.

30. Lind, R., Triplett, K., Bowers, H., Gunn, G., Lim, G., Ma, C., and **Liu, M.X.** 2013. Mammalian cell systems for efficient therapeutic protein production. Biomaterial Conference. Nashville, TN, March 14-15.
31. Gunn, H., Triplett, K., Bowers, H., Lind, R., Lim, G., Ma, C., and **Liu, X.M.** 2013. Butyric acid and butanol production by metabolic engineering of *C. tyrobutyricum*. Biomaterial Conference. Nashville, TN, March 14-15.
32. Ma, C. and **Liu, X.M.** 2013. How to increase the butonal production by metabolic engineering of *C. tyrobutyricum*? Inaugural SEC Symposium, Atlanta, GA, Feb 10-12, 2013.
33. **Liu, X.** 2012. How to improve biopharmaceutical production efficiency using integrated bioprocessing? AIChE. Pittsburg, Oct 28-Nov 02.
34. Ma, C., and **Liu, X.** 2012. Biobutyric acid and biobutanol production from metabolically engineered *Clostridium tyrobutyricum.* ACS at UA. Tuscaloosa, Oct 25.
35. Bakies, M., Ma C., and **Liu, X.** 2012. C4 biofuel and high value biochemical production using metabolically engineered clostridia. AIChE. Pittsburg, Oct 28 - Nov 02.
36. Chiu, J. and **Liu, X.** 2012. Biobutanol production using metabolically engineered Clostridia. Advanced Energy Research & Technology Center (AERTC). New York, October 30-31.
37. Slade, P. G., Piras, G., **Liu**, **X.M**., Koch, D.C., Hutanu, D., Moody-Bartel, C., Gorfien, S.F. 2011. Secretome monitoring in recombinant CHO-DG44 cells using click chemistry. ASMS.
38. Anson, S.R., Dempsey, J., Wu, F., **Liu, X.M.,** Donahue-Hjelle, L., and Gorfien, S. 2011. Metabolic characterisation of recombinant CHO cells in batch culture. 22nd ESACT, Vienna. May 15-18.
39. Gorfien, S., Donahue-Hjelle, L., Wang, S-Y., **Liu, X.M.,** Schageman, J. 2011. Comparative analysis of CHO cell transcriptional dynamics under different cell culture conditions using next generation RNA-sequencing technology. 22nd ESACT, Vienna. May 15-18.
40. Piras, G., Sabourin, M., Huang, Y., **Liu, X.M.,** Liu, J., Slade, P., Wang, S-Y, and Gorfien, S. 2011. Product quality using the freedom CHO production platforms. 22nd ESACT, Vienna. May 15-18.
41. **Liu, X.M.,** Beatty, S., Piras G, Wang, S.Y. 2011. Reducing antibody production timeline and cost through cell line development workflow and cell culture process improvements. 26th IBC, Seattle, March 16-18.
42. Slade, P., Piras, G., **Liu, X.M.,** Koch, D., Moody-Bartel, C., Gorfien, S. 2011. Secretome monitoring in recombinant CHO-DG44 cells using click chemistry. 59th ASMS, Denvor, June 5-9.
43. Dhulipala, P., Reddy, H., **Liu, X.M.,** Saubourin, M., Piras, G., Hassett, R. and Gorfien, S. P. 2011. CHO DG44 and CHO-S have different medium requirements for successful single cell cloning. BME XVII Conference. Seattle.
44. Slade, P. G., Koch, D. C., Hutanu, D., Lei, M., Judd, D., **Liu, X.,** Piras, G., Moody Bartel, C., Gorfien, S. 2010. Changes in media composition due to expression of IgG in HEK293 and CHO DG44 cells. Cell Culture Engineering XII, Banff, Alberta Canada, Apr 25-30.
45. **Liu X.**, Liu J., WilliamsT., Ravnikar P., Piras G., and Wu F. 2009. Linking host cell engineering with an integrated strategy for nutrient feeding to improve protein production. The 237th ACS National Meeting, Washington DC, Aug 17-20.
46. Ravnikar, P., **Liu, X.,** Liu, J., Williams, T., and Wu, F. 2009. Novel cell lines for bioproduction: friend or foe?. 21th ESACT, Dubline, Ireland. Jun 7-10.
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INVITED LECTURES

2016 University of Alabama at Birmingham, Department of Biomedical Engineering
2015 Case Western and Reserved University, Department of Chemical and Biomolecular Engineering
2014 University of Tulane, Department of Chemical Engineering
2014 Tianjin University, Department of Biological Engineering
2013 University of Alabama at Birmingham, Department of Biomedical Engineering
2013 University of Alabama, REU program
2012 The Ohio State University, Department of Chemical and Biological Engineering
2012 Tianjin University, Department of Biological Engineering

THESIS ADVISOR

Currently Advised Graduate Students:
2013- Ningning Xu, Ph.D. student, expected 2017 (The University of Alabama)
2014- Jianfa Ou, Ph.D. student, expected 2018 (The University of Alabama)
2015- Ryan Malden, M.S. student, expected 2016 (The University of Alabama)

Thesis Advisor:
2016 Chao Ma, Ph.D., The University of Alabama, Current position: Scientist, Bristol-Myers Squibb (BMS), Boston, MA