Liang Yu, PhD, PE

1401 NE Merman Dr. Apt 704 yuliang08wsu@gmail.com
Pullman WA 99163-4443 (509) 592-5058

Education

Ph.D. Biological and Agriculture Engineering
Washington State University, 2012

Ph.D. Chemical Engineering
Chinese Academy of Sciences, 2008

M.S. Petroleum Processing Engineering
China University of Petroleum, 2004

B.S. Polymer Engineering
Zhejiang University, 1992

Awards

Outstanding Reviewer, *Journal of Environmental Management*, September 2018
Outstanding Reviewer, *Biochemical Engineering Journal*, September 2017
Outstanding Reviewer, *Journal of Biomass & Bioenergy*, May 2014
WSU travel grant, USA 2011
The Alfred & Genevieve Galluci Scholarship, WSU, USA 2010
Institute President Scholarship, IPE, China 2007

Professional Certifications/Licenses

Professional Engineer (PE), Cert/Lic No. 49304 05/29/2012, WA, USA
Engineer-in-Training (EIT), Cert/Lic No. 31971, 12/09/2011, WA, USA

Professional Work Experience

Research Assistant Professor (49%FTE) Department of Biological Systems Engineering, Washington State University, Pullman, WA. 2020 – present

Chief Technology Officer (51%FTE) Integrated Lipid Biofuels, LLC, Spokane, WA. 2022 – present

Research Associate Department of Biological Systems Engineering, Washington State University, Pullman, WA. 2012 – 2019

Production Manager Production and Processes Control Center, Dushanzi Oil Refinery, China National Petroleum Corporation (CNPC), Xinjiang 1994 – 2001

Engineer Polypropylene plant, Dushanzi Oil Refinery, CNPC, Xinjiang 1992 – 1994

Teaching Experience

Lecturer, BSYSE 597 "Biomass Biological Process Engineering", Fall 2023, Washington State University (Teaching Aspen plus software)

Lecturer, "Process Design and Techno-Economic Analysis", Undergraduate English Course, Summer 2023, College of Engineering, Huazhong Agricultural University, China.

Lecturer, 'Progress of anaerobic digestion technology for biogas production'. The Second

International Training Course on Industrial Synthetic Biotechnology, December 12 - 23, 2021, Tianjin, China.

Lecturer, BSYSE 597 "Biomass Biological Process Engineering", Fall 2022, Washington State University (Teaching Aspen plus software)

Lecturer, "Process Design and Techno-Economic Analysis", Undergraduate English Course, Summer 2022, College of Engineering, Huazhong Agricultural University, China.

Lecturer, "Process Design and Techno-Economic Analysis", Undergraduate English Course, Summer 2021, College of Engineering, Huazhong Agricultural University, China.

Lecturer, BSYSE 595 "Biosystems Engineering for Fuel and Chemicals", Spring 2016, Washington State University (Teaching Transport Phenomena, Computational Fluid Dynamics (CFD), Aspen plus, Matlab&Simulink, Metabolic Flux Analysis (MFA) and Molecular Simulation for the application of bioprocess)

Lecturer, BSYSE 595 Biosystems Engineering for Fuel and Chemicals, Spring 2013, Washington State University

Teaching Assistant, BSYSE 595 Biosystems Engineering for Fuel and Chemicals, 2009-2012, Washington State University

Participated in the teaching training: UNIV590 Preparation for College Teaching, Fall 2011, Washington State University

Graduate Co-advisor

Shalini Abeysinghe (Sri Lanka, Fall 2023)

Teshan Udayanga (Sri Lanka, Spring 2023)

Sarah Kemmerer (U.S., Fall 2022)

Hasan Shahriar Rahat (Bangladesh, Fall 2022)

Oluwatunmise Dada (Nigeria, Fall 2022)

PhD Committee Member

Do-Gyun Kim (South Korea, Fall 2019)

Meghana Mendon (India, Fall 2021)

Master Committee Member

Anthony Simerlink, (U.S., Fall 2020)

Student Mentoring

(1) *Project research* – PhD students: Sujala Bhattarai (Nepal), Dianlong Wang (China), Xiangyu Gu (China), Yuan Zhang (China), Xiaoling Wang (China); Master students: Iin Parlina (Indonesia), Pei-yu Leu (Taiwan), Ruohao Tang (China), Zhiyou Zong (China); Robert Chase Llewellyn (USA); Undergraduate student: Sarah Kemmerer (WSU), Clare Bria Tell (WSU), Olivia M. Hunt (Skidmore College)

(2) *ASPEN software teaching* (Spring, 2017 - Spring, 2021) worked with Dr. Marc Levin – Undergraduate students of Chemical Engineering at WSU: Jonson Alexander Monroe, Meyer Jordan Joseph, Stokes Isaac Madison, Al Abdul Salam Nasser Mohamme, Johnson Brian Matthew, Nicoll Collin Jeffrey, Kershaw Emily Michelle, Garcia Karissa B etc.

(3) *Awards for Student Mentoring*

"Nutrient recovery – based large-scale swine waste anaerobic digestion system", Undergraduate

students of Huazhong Agricultural University to win the first place prize in the creative design competition for Agriculture, Architecture, Environment and Energy Engineering, July 20 – 22, 2016, Guangzhou, China

"Breaking Waste by Microbiome Revolution", Graduate students of Washington State University to win Prototype Funding for Alaska Airlines Environmental Innovation Challenge, January 11, 2017

Publications (Google Scholar: H-Index: 33, I10-Index: 46, Citation: 3508)

1. D.G. Kim, S. Witherrite, **L. Yu**, Q. Zhao, and S. Chen. 2023. 'Novel Ammonia Recovery from Anaerobic Digestion by Integrating Biogas Stripping and Gypsum Absorption'. *Process Safety and Environmental Protection*.
2. T.C. D'Silva, S.A. Khan, S. Kumar, D. Kumar, A. Isha, S. Deb, S. Yadav, B. Illathukandy, R. Chandra, V.K. Vijay, P.M. Subbarao, Z. Bagi, K.L. Kovacs, **L. Yu**, B.P. Gandhi, and K.T. Semple. 'Biohydrogen production through dark fermentation from waste biomass: Current status and future perspectives on biorefinery development'. 2023, *Fuel*, 350, p.128842.
3. **L. Yu**, D.G. Kim, P. Ai, H. Yuan, J. Ma, Q. Zhao and S. Chen. 'Effects of Metal and Metal Ion on Biomethane Productivity during Anaerobic Digestion of Dairy Manure'. 2023, *Fermentation*, 9(3), p.262.
4. H. Fang, C. Zhao, C. Li, Y. Song, **L. Yu**, X. Song, J. Wu, and L. Yang. 'Direct consolidated bioprocessing for D-glucaric acid production from lignocellulose under subcritical water pretreatment'. 2023, *Chemical Engineering Journal*, 454, p.140339.
5. H. Fang, Y. Deng, Y. Pan, C. Li, and **L. Yu**. Distributive and collaborative push‐and‐pull in an artificial microbial consortium for improved consolidated bioprocessing. 2022, *AIChE* Journal, p.e17844.
6. **L. Yu**, T. Li, J. Ma, Q. Zhao, P. Wensel, J. Lian, and S. Chen. 'A kinetic model of heterotrophic and mixotrophic cultivation of the potential biofuel organism microalgae *Chlorella sorokiniana*'. 2022, *Algal Research*, 64, p.102701.
7. P. C. Wensel, M. Bule, A. Gao, M. R. Pelaez-Samaniego, **L. Yu**, W. Hiscox, G. L. Helms, W. C. Davis, H. Kirchhoff, M. Garcia-Perez, and S. Chen. 'Biorefinery Processing of Waste to Supply Cost-Effective and Sustainable Inputs for Two-Stage Microalgal Cultivation'. *Applied Sciences* 2022, 12, no. 3: 1485. https://doi.org/10.3390/app12031485
8. W.C. Xu, L.B. Zhong, Z.D. Shao, S. Dou, **L. Yu**, X. Cheng, and Y.M. Zheng. 'Rational design of pore structures for carbon aerogels to significantly increase adsorption of tetracycline from water using batch and fixed-bed operation'. *Environmental Science: Nano* 2021, 8(11): 3250 – 3261.
9. J. Ma, L. Shu, S.M. Mitchell, **L. Yu**, Q. Zhao, and C. Frear. 'Effects of different antibiotic operation modes on anaerobic digestion of dairy manure: Focus on microbial population dynamics'. *Journal of Environmental Chemical Engineering* 2021, 9(4): p.105521.
10. J. Ma, L. Li, Q. Zhao, **L. Yu**, C. Frear. 'Biomethane production from whole and extracted algae biomass: long-term performance evaluation and microbial community dynamics'. *Renewable Energy* 2021, 170:38 – 48.

11. M. Abro, **L. Yu**, G. Yu, X. Chen, A. B. Qazia. 'Experimental investigation of hydrodynamic parameters and bubble characteristics in CO_2 absorption column using pure ionic liquid and binary mixtures: Effect of porous sparger and operating conditions'. *Chemical Engineering Science* 2021, (229): 116041
12. D. Li, R. Tang, **L. Yu**, L. Chen, S. Chen, S. Xu, and F. Gao. 'Effects of increasing organic loading rates on reactor performance and the methanogenic community in a new pilot upflow solid reactor for continuously processing food waste'. *Renewable Energy* 2020 (153): 420 – 429.
13. X. Gu, **L. Yu**, N. Pang, J.S. Martinez-Fernandez, X. Fu, and S. Chen. 'Comparative techno-economic analysis of algal biofuel production via hydrothermal liquefaction: One stage versus two stages'. *Applied Energy* 2020: 114115.
14. S.S. Mirza, J.I. Qazi, **L. Yu**, and S. Chen. 'Growth characteristics and photofermentative biohydrogen production potential of purple non sulfur bacteria from sugar cane bagasse'. *Fuel* 2019 (255): 115805.
15. J. Ma, S. Xie, **L. Yu**, Y. Zhen, Q. Zhao, C. Frear, S. Chen, Z.W. Wang, and Z. Shi. 'pH shaped kinetic characteristics and microbial community of food waste hydrolysis and acidification'. *Biochemical engineering journal* 2019 (146): 52 – 59.
16. M.F. Ali, **L. Yu**, X. Chen, G. Yu, A.A. Abdeltawab, and S.M. Yakout. Numerical modeling for characterization of CO_2 bubble formation through submerged orifice in ionic liquids. *Chemical Engineering Research and Design* 2019 (146): 104 – 116.
17. P. Ai, X. Zhang, C. Dinamarca, M. Elsayed, **L. Yu**, J. Xi, and Z. Mei. 'Different effects of ozone and aqueous ammonia in a combined pretreatment method on rice straw and dairy manure fiber for enhancing biomethane production'. *Bioresource technology* 2019(282): 275 – 284.
18. D. Wang, Y. Xin, H. Shi, P. Ai, **L. Yu**, X. Li, and S. Chen. 'Closing ammonia loop in efficient biogas production: Recycling ammonia pretreatment of wheat straw'. *Biosystems Engineering* 2019 (180): 182 – 190.
19. H. Yuan, Y. Lan, J. Zhu, A.C. Wachemo, X. Li and **L. Yu**. 'Effect on anaerobic digestion performance of corn stover by freezing–thawing with ammonia pretreatment'. *Chinese journal of chemical engineering* 2019, *27*(1): 200 – 207.
20. Y. Yao, **L. Yu**, R. Ghogare, A. Dunsmoor, M. Davaritouchaee, S. Chen. 'Simultaneous ammonia stripping and anaerobic digestion for efficient thermophilic conversion of dairy manure at high solids concentration'. *Energy* 2017 (141): 179 – 188.
21. X. Wang, **L. Yu**, S. Chen. 'UP Finder: A COBRA toolbox extension for identifying gene overexpression strategies for targeted overproduction'. *Metabolic Engineering Communications* 2017 (5): 54 – 59.
22. W. Guo, D. Li, R. He, M. Wu, W. Chen, F. Gao, Z. Zhang, Y. Yao, **L. Yu**, S. Chen. 'Synthesizing value-added products from methane by a new *Methylomonas*'. *Journal of Applied Microbiology* 2017 123(5): 1214 – 1127.
23. D. Wang, J. Xi, P. Ai, **L. Yu**, H. Zhai, S. Yan, Y. Zhang. 'Enhancing ethanol production from thermophilic and mesophilic solid digestate using ozone combined with aqueous ammonia

pretreatment'. *Bioresource technology* 2016, 207: 52-58.
24. Y. Zhang, G. Yu, **L. Yu**, M. A. H. Siddhu, M. Gao, A. A. Abdeltawab, S. S. Al-Deyab, X. Chen. 'Computational fluid dynamics study on mixing mode and power consumption in anaerobic mono- and co-digestion'. *Bioresource Technology* 2016, 203(3): 166–172.
25. Y. Wei, X. Li, **L. Yu**, D. Zou, H. Yuan. 'Mesophilic anaerobic co-digestion of cattle manure and corn stover with biological and chemical pretreatment'. *Bioresource Technology* 2015, 198(12): 431 – 436.
26. T. Dong, **L. Yu**, D. Gao, X. Yu, C. Miao, Y. Zheng, J. Lian, T. Li, S. Chen. 'Direct quantification of fatty acids in wet microalgal and yeast biomass via a rapid in situ fatty acid methyl ester derivatization approach'. *Applied microbiology and biotechnology* 2015, (on line) 1 – 11.
27. Z. Zong, L. Gao, W. Cai, **L. Yu,** C. Cui, S. Chen, D. Zhang. 'Computer-Assisted Rational Modifications to Improve the Thermostability of β-Glucosidase from *Penicillium piceum* H16'. *BioEnergy Research* 2015, 8(3): 1384 – 1390.
28. D. Wang, P. Ai, **L. Yu**, Z. Tan, Y. Zhang. 'Comparing the hydrolysis and biogas production performance of alkali and acid pretreatments of rice straw using two-stage anaerobic fermentation'. *Biosystems Engineering* 2015, 132: 47 – 55.
29. Q. Zhao, J. Ma, **L. Yu**, S. Chen, and C. Frear. 'Ammonia recovery from anaerobic digester effluent through direct aeration'. *Chemical Engineering Journal* 2015, 279: 31 – 37.
30. Z. Zong, L. Ma, **L. Yu**, D. Zhang, Z. Yang, S. Chen. 'Interaction mechanism between polyethylene glycol (PEG) and cellulase during hydrolysis of lignocellulose'. *BioEnergy Research* 2015, 8(1): 270 – 278.
31. X. Chen, H. Guo, A. Abdeltawab, Y. Guan, S. Al-Deyab, G. Yu, **L. Yu**. 'Brønsted–lewis acidic ionic liquids and application in oxidative desulfurization of diesel fuel'. *Energy Fuels* 2015, 29 (5): 2998 – 3003.
32. J. Ibrahim, S. Gao, A. Abdeltawab, S. Al-Deyab, **L. Yu**, G. Yu, X. Chen, X. Yong. 'Extractive desulfurization of fuel oils with dicyano(nitroso)methanide-based ionic liquids'. *Separation Science and Technology* 2015, 50(8): 1166 – 1174.
33. **L. Yu**, M. Bule, J. Ma, Q. Zhao, C. Frear, S. Chen. 'Enhancing volatile fatty acid (VFA) and bio-methane production from lawn grass with pretreatment'. *Bioresource Technology* 2014, 162(6): 243–249.
34. D. Yang, Y. Pang, H. Yuan, S. Chen, J. Ma, **L. Yu,** X. Li. 'Enhancing biogas production from anaerobically digested wheat straw through ammonia pretreatment'. *Chinese Journal of Chemical Engineering* 2014, 22 (5): 576–582.
35. T. Li, Y. Zheng, **L. Yu**, S. Chen. 'Mixotrophic cultivation of a microalga Chlorella sorokiniana for biofuel production'. *Biomass and Bioenergy* 2014, 66: 204 – 213.
36. X. Chen, S. Yuan, A. Abdeltawab, S. Al-Deyab, **L. Yu**, G. Yu. 'Extractive Desulfurization and Denitrogenation of Fuels Using Functional Acidic Ionic Liquids'. *Separation and Purification Technology* 2014, 133 (9): 187–193.
37. Y. Xiao, H. Yuan, Y. Pang, S. Chen, B. Zhu, D. Zou, J. Ma, **L. Yu**, X. Li. 'CO_2 Removal from Biogas by Water Washing System'. *Chinese Journal of Chemical Engineering* 2014,

22(8): 950 – 953.

38. **L. Yu,** J. Ma, C. Frear, Q. Zhao, R. Dillon, X. Li, S. Chen. **'**Multiphase modeling of settling and suspension in anaerobic digester'. *Applied Energy* 2013, 111(11):28–39.
39. **L. Yu,** P. Wensel, J. Ma, S. Chen. (2013) 'Mathematical modeling in anaerobic digestion (AD)'. *J. Bioremediation & Biodegradation* S4: 003. doi:10.4172/2155-6199.S4–003.
40. P. Wensel, G. Helms, B. Hiscox, W. C Davis, H. Kirchhoff, M. Bule, **L. Yu**, S. Chen. 'Isolation, characterization, and validation of oleaginous, multi-trophic, and haloalkaline-tolerant microalgae for two-stage cultivation'. *Algal Research* 2014, 4 (4): 2–11.
41. A. Charles, M. R. Haque, **L. Yu**, X. Wu, X. Chen, G. Yu. 'Desulfurization of real fuel oils by extraction with ionic liquids'. *Separation Science and Technology* 2013, 48(17): 2582–2588
42. S. Bhattarai, D. H. Kim, J. H. Oh, **L. Yu**. (2013) 'Simulation study for pneumatic conveying drying of sawdust for pellet production'. *Drying technology* 2014, 32(10): 1142 – 1156.
43. F. Shen, H. Yuan, Y. Pang, S. Chen, B. Zhu, D. Zou, Y. Liu, J. Ma, **L. Yu,** X. Li. **'**Performances of anaerobic co-digestion of fruit & vegetable waste (FVW) and food waste (FW): single-phase vs. two-phase' *Bioresource Technology* 2013, 144(9): 80–85
44. **L. Yu**, Y. Chao, P. Wensel, S. Chen. 'Hydrodynamic and kinetic study of cellulase production by *Trichoderma reesei* with pellet morphology'. *Biotechnology & Bioengineering* 2012, 109(7): 1755 – 1768.
45. **L. Yu,** Q. Zhao, J. Ma, C. Frear, S. Chen. 'Experimental and modeling study of a two-stage pilot scale high solid anaerobic digester system'. *Bioresource Technology* 2012, 124(11): 8 – 17.
46. J. Ma, B. Zhao, C. Frear, Q. Zhao, **L. Yu**, X. Li, S. Chen. 'Methanosarcina Domination in Anaerobic Sequencing Batch Reactor at Short Hydraulic Retention Time'. *Bioresource Technology* 2013, 137 (6): 41 – 50.
47. J. Ma, C. Frear, Z. Wang, **L. Yu**, Q. Zhao, X. Li, S. Chen. (2013). 'A simple methodology for rate-limiting step determination for anaerobic digestion of complex substrates and effect of microbial community ratio'. *Bioresource Technology* 2013, 134 (4): 391 – 395.
48. X. Wang, **L. Yu (corresponding author)**, J. Wang. 'Numerical simulation of effect of internals on slugging fluidization and analysis of nonuniformity index'. *International Journal of Chemical Reactor Engineering* 2012, 10(1): 1515 – 1542.
49. J. Zeng, Y. Zheng, X. Yu, **L. Yu**, D. Gao, S. Chen. 'Lignocellulosic biomass as a renewable carbohydrate source for microbial lipid production'. *Bioresource Technology* 2013, 128(1): 385 – 391.
50. J. Wang, G. Sun, **L. Yu**, F. Wu, X. Guo. 'Enhancement of the selective enzymatic biotransformation of rutin to isoquercitrin using an ionic liquid as a co-solvent'. *Bioresource Technology* 2013, 128(1): 156 – 163.
51. T. Li, Y. Zheng, **L. Yu**, S. Chen. 'High productivity cultivation of a heat-resistant microalga *Chlorella sorokiniana* for lipid production'. *Bioresource Technology* 2013, 131(3): 60 – 67.
52. J. Ma, **L. Yu**, C. Frear, Q. Zhao, X. Li, S. Chen. 'Kinetics of psychrophilic anaerobic sequencing batch reactor treating flushed dairy manure'. *Bioresource Technology* 2013,

131(3): 6 – 12.

53. J. Wang, Y. Ma, R. Xia, G. Sun, L. Zhang, **L. Yu**, F. Wu, X. Guo. 'Selective hydrolysis by commercially available hesperidinase for isoquercitrin industrial production'. *Journal of Molecular Catalysis B: Enzymatic* 2012, 81(9): 37 – 42.
54. Y. Chao, D. Singh, **L. Yu**, Z. Li, Z. Chi, S. Chen. 'Secretome characteristics of pelletized *Trichoderma reesei* and cellulase production'. *World Journal of Microbiology and Biotechnology* 2012, 28(8): 2635 – 2641.
55. P. Wensel, **L. Yu,** S. Chen. 'Simulation with computational fluid dynamics of succinic acid and co-product biorefinery process'. *Journal of Bioprocess and Biotechniques* 2011, S:2 http://dx.doi.org/10.4172/2155-9821.S2-002
56. **L. Yu**, Q. Zhao, A. Jiang, S. Chen. 'Analysis and optimization of ammonia stripping using multi-fluid model'. *Water Secience & Technology* 2011, 63(6): 1143–1152.
57. **L. Yu**, J. Ma, S. Chen. 'Numerical simulation of mechanical mixing in high solid anaerobic digester'. *Bioresource Technology* 2011, 102(2): 1012–8.
58. X. Wang, H. Dong, X. Zhang, **L. Yu,** S Zhang. 'Numerical simulation of single bubble motion in ionic liquids'. *Chemical Engineering Science* 2010, 65(22): 6036–6047.
59. **L. Yu**, J. Lu, X. Zhang, S. Zhang. 'Two fluid model with kinetic theory for modeling of one-step hydrogen production gasifier'. *AIChE Journal* 2008, 54(11): 2833–2871.
60. J. Lu, **L. Yu**, X. Zhang, S. Zhang. 'Hydrogen production from a fluidized-bed coal gasifier with in situ fixation of CO_2 Part I: Numerical Model'. *Chemical Engineering & Technology* 2008, 31 (2): 197–207.
61. **L. Yu**, J. Lu, X. Zhang, S. Zhang. 'Numerical simulation of the bubbling fluidized bed coal gasification by the kinetic theory of granular flow (KTGF)'. *Fuel* 2007, 86: 722–734.
62. J. Lu, **L. Yu**, X. Zhang. 'Numerical simulation of fluidized bed coal gasifier with in-situ CO_2 removal'. *Computers and Applied Chemistry* 2007, 11: 1527–1532 (In Chinese).
63. **L. Yu**, J. Gao, C. Xu, Y. Wang. 'Influence of jet loop reactor system structure on liquid-solid flow behavior and analysis of the interporosity flow'. *Journal of Chemical Engineering of Chinese Universities* 2005, 19(3): 320–326 (In Chinese).
64. **L. Yu**, Y. Wang, J. Gao, C. Xu. 'The operation analysis of the reaction-regeneration system in liquid-solid loop reactor and the simulation of draft tube'. *Journal of Chemical Engineering of Chinese Universities* 2004, 18(6): 690–695 (In Chinese).

Patents

- ✧ Meghana Mendon, **L. Yu**, S. Chen. 'Recovery of high purity volatile fatty acids (VFA) by hyperthermophilic anaerobic acidification in-situ separation technology'. US Invension Disclosure, Disclosure-24-00017, 2023
- ✧ Sarah Kemmerer, **L. Yu**, S. Chen. 'Self-sustaining system to recover clean water, renewable energy, and valuable products from animal manure wastewater'. US Invension Disclosure, Disclosure-24-00014, 2023
- ✧ **L. Yu**, S. Chen, Xianhui Zhao. 'Two-stage hyperthermophilic anaerobic acidification and engineered yeast fermentation system for the conversion of food waste into sustainable

aviation fuel (SAF) and bioplastics'. US Invension Disclosure, Disclosure-24-00002, 2023

- ✧ **L. Yu**, S. Chen. 'A high rate two-phase pressurized anaerobic digestion system producing high purity of methane from diverse waste biomass'. US Invension Disclosure, 2020
- ✧ **L. Yu**, D. Wang, I. Parlina, Y. Yao, P. Ai, D. Li, S. Chen. 'A method that integrates dilute ammonia pretreatment at high temperature and thermophilic high solid anaerobic digestion to enhance biogas productivity'. US Invension Disclosure June 22, 2016; Chinese Patent: Publication No.: CN107674887A, Febrary 9, 2018.
- ✧ **L. Yu**, R. Tang, D. Li, J. Ma, S. Chen. 'An up-flow anaerobic digester without internals'. Chinese Patent: Granted No.: CN104556367B.
- ✧ **L. Yu**, J. Ma, C. Frear, U. Zaher, S. Chen (advisor). 'Two-stage anaerobic digestion for solid-liquid phases with recycling effluent'. Chinese Patent: Patent No.: 201210448062; Granted No.: CN103045651B
- ✧ **L. Yu**, J. Ma, C. Frear, U. Zaher, S. Chen (advisor). 'Two-stage anaerobic digestion systems wherein one of the stages comprises a two-phase system'. United States Patent and Trade Office. US Patent: US20130309740A1, Grant Date of November 22, 2016.
- ✧ S. Zhang (advisor), **L. Yu (Lead inventor)**, F. Gao, H. Wang. 'Method of coupling hydrogen production by gasification with desulphurization for petroleum coke'. Chinese Patent: Patent No.: 200710064514.3, Granted No.: CN 100595264C
- ✧ S. Zhang (advisor), **L. Yu (Lead inventor)**, F. Gao, H. Wang, Y. Zhang, X. Yuan. 'Method of desulphurizing petroleum coke by ionic liquids'. Chinese Patent: Patent No.: 200710064515.8, Granted No.: CN 100595262C

Presentations

1. **L. Yu** (PD), S. S Sablani (Co-PD), S. Chen. 'SBIR Phase II: Converting Organic Waste to Biopolymer by Synergizing Anaerobic Digestion and Synthetic Biology'. Selected Speaker, USDA 2023 Bioeconomy Project Director (PD) meeting, July 13 – 14, 2023, Kansas City, MO, USA.
2. **L. Yu**, D. Kim, M. C Mendon, S. Chen. 'Techno-economic analysis of an efficient and cost-effective novel anaerobic digestion system producing high-purity of methane'. ASABE 2023, Annual International Meeting, July 9– 12, 2023, Omaha, NE, USA.
3. D. Kim, M. C Mendon, **L. Yu**, S. Chen. 'Two-stage anaerobic digestion integrating hyper-thermophilic and thermophilic reactors operation and its optimization'. ASABE 2023, Annual International Meeting, July 9– 12, 2023, Omaha, NE, USA.
4. M. C Mendon, **L. Yu**, S. Chen. 'Integration of mesophilic anaerobic digestion of dairy manure with hydrothermal treatment'. ASABE 2023, Annual International Meeting, July 9–12, 2023, Omaha, NE, USA.
5. **L. Yu**, D. Kim, S. Chen. 'Application of Machine Learning to Industrial Anaerobic Digestion Facilities for the Improvement of the Performance'. Appendix A Seminar Series, Fall 2022. Oct 4, 2022, Zoom Online Meeting.
6. **L. Yu**, D. Kim, S. Chen. 'Effects of metal and metal ion on biomethane productivity during anaerobic digestion of dairy manure'. ASABE 2022, Annual International Meeting, July

17– 21, 2022, Houston, TX, USA.

7. D. Kim, **L. Yu**, S. Chen. 'Ammonia Recovery from the Anaerobic Effluent by Integrating Biogas Stripping and Gypsum Absorption'. ASABE 2022, Annual International Meeting, July 17– 21, 2022, Houston, TX, USA.
8. **L. Yu**. 'Progress of anaerobic digestion technology for biogas production'. The Second International Training Course on Industrial Synthetic Biotechnology, December 20 -30, 2021, Tianjin, China.
9. **L. Yu**, S. Chen, M. Garcia-Perez. 'Sequential Hydrothermal Liquefaction (SeqHTL) and Anaerobic Digestion (AD) for Algal Biorefinery'. Giant Kelp Cluster for Industry-University Cooperative Research Centers Program (IUCRC), University of Southern California, Los Angeles, CA. August 27, 2021
10. **L. Yu**, M. Chen, Z. Liu, P. Ai, S. Chen. 'Techno-economic analysis (TEA) of a sustainable animal farm wastewater treatment technology'. Invited talk, the 1st Online International Conference of High Value-added Utilization of Agricultural and Forestry Wastes and Pollution Control (ICUAFW) on November 19, 2020
11. **L. Yu**, S. Chen, X. Xiong, X. Gu. 'A Readily Deployable Living Support (RDLS) System Powered by Biomass'. Washington State University (WSU) - Defense Advanced Research Projects Agency (DARPA) Workshop, Lewis Alumni Center, Pullman, WA. October 10, 2019
12. **L. Yu**. 'Biorefinery multi-scale modeling: from fundamental to application'. Invited presentation, Huazhong Agricultural University, Wuhan, China. September 30, 2016.
13. **L. Yu**. 'Biorefinery multi-scale modeling: from fundamental to application'. Invited presentation, Tianjin Institute of Industrial Biotechnology, Chinese Academy of Sciences, Tianjin, China. September 28, 2016.
14. **L. Yu**, S. Chen. 'Advancements in technologies for converting organic wastes to bio-products and bio-energy'. 2016 Global Chinatown Conference Seattle Summit. Bell Harbor International Conference Center. Seattle, Washington, U.S.A. February 22 - 24, 2016
15. **L. Yu**, C. Frear, X. Liu, X. Zhang. 'Research and Development of New Nutrient Recovery (NR) Technology'. China Biogas Annual Conference and Sino-German Collaboration Forum, December 15 – 16, 2015, Guangzhou City, Guangdong Province, China.
16. J. Ma, **L. Yu**, Q. Zhao, S. Chen, and C. Frear. 'Kinetic and microbial community analysis for enhanced food waste hydrolysis: an investigation on pH'. ASABE 2015, Annual International Meeting, July 26-29, 2015, New Orleans, LA, USA.
17. I. Zeb, J. Ma, Q. Zhao, **L. Yu**, C. Frear. 'Recycling AD effluent as dilution water for AD process: effects of TAN and salinity'. ASABE 2015, Annual International Meeting, July 26–29, 2015, New Orleans, LA, USA.
18. **L. Yu**, J. Ma, Q. Zhao, C. Frear, S. Chen. 'Enhance Volatile Fatty Acid (VFA) and Bio-Methane Productivity by Pretreatment of Lawn Grass'. ASABE 2013, Annual International Meeting, July 21 – 24, 2013, Kansas City, Missouri.
19. J. Ma, B. Zhao, Q. Zhao, **L. Yu**, C. Frear, S. Chen. 'Psychrophilic Anaerobic Sequencing Batch Reactor with Biofilm Supported by Solids from Dairy'. ASABE 2013, Annual

International Meeting, July 21 – 24, 2013, Kansas City, Missouri

20. Q. Zhao, C. Frear, C. Alwine, J. Ma, **L. Yu**, S. Chen. 'Nitrogen and Phosphorus Recovery from Anaerobic Digested Dairy Wastewater'. ASABE 2013, Annual International Meeting, July 21 – 24, 2013, Kansas City, Missouri
21. S. Chen, **L. Yu,** U. Zaher, Q. Zhao, C. Frear. (2012) 'A New High-Solids Anaerobic Digestion System', Bioenergy Research Symposium: Seattle, WA.
22. **L. Yu,** S. Chen. (2012) 'Develop a New Two-stage High Solid Anaerobic Digestion for Food Waste', BIT's 2nd New Energy Forum-2012, October 19 – 21, 2012, Guangzhou, China.
23. **L. Yu,** U. Zaher, Q. Zhao, J. Ma, S. Chen. (2011) 'Experimental and Modeling Study of a Two-Stage Pilot Scale High Solid Anaerobic Digester System', AIChE Annual Meeting: Minneapolis, MN.
24. S. Chen, **L. Yu,** J. Ma, C. Frear. (2011) 'Towards Developing Anaerobic Digestion Based Biorefinery – Research On Food Wastes As Feedstock', AIChE Annual Meeting: Minneapolis, MN.
25. J. Ma, **L. Yu,** S. Chen. (2011) 'Influent Solids Retained High Biomass Reactor Treating Dairy Manure Wastewater and Kinetics Study', AIChE Annual Meeting: Minneapolis, MN.
26. J. Ma, **L. Yu,** Y. Zheng, S. Chen. (2011) 'Enhanced Food Waste Hydrolysis for Integrated Biofuel Production', AIChE Annual Meeting: Minneapolis, MN.
27. **L. Yu**, Q. Zhao, A. Jiang, S. Chen. 'Analysis and Optimization of Ammonia Stripping using Multi-fluid Model'. 12th World Congress on Anaerobic Digestion, Nov. 2010, Guadalajara, Mexico.
28. Q. Zhao, A. Jiang, **L. Yu**, C. Frear, S. Chen. 'An Integrated Pathogen Control, Ammonia and Phosphorus Recovery System for Manure and/or Organic wastes'. WSU showcase, Mar. 2009.
29. **L. Yu**, S. Chen. 'Mechanical Mixing of Non-Newtonian Fluid Flow in Anaerobic Digestion'. AIChE Annual Meeting, Nov. 2009, Nashville, TN.
30. H. Dong, X. Wang, L. Liu, **L. Yu**, X. Zhang, S. Zhang. 'Measurements and Simulation of Dynamics of a Small Bubble in Stagnant Ionic Liquids'. 9th International Symposium on Green Chemistry in China, May 2008, Hefei, China.
31. **L. Yu**, J. Lu, X. Zhang, S. Zhang. 'Study Characteristics of Complicated Flow Field in Bubbling Fluidized Bed by CFD'. AIChE Annual Meeting, Nov. 2006, San Francisco, CA.
32. J. Lu, **L. Yu**, X. Zhang, S. Zhang. 'Numerical Simulation of Green Circulating Fluidized Coal Gasifier'. AIChE Annual Meeting, Nov. 2006, San Francisco, CA.
33. J. Lu, **L. Yu**, X. Zhang, S. Zhang. 'Numerical Simulation of Green Circulating Fluidized Coal Gasifier for H_2 Product'. The ESCAPE-16 and PSE2006 Conferences, Jul. 2006, Garmisch-Partenkirchen, Germany.
34. **L. Yu**, J. Lu, X. Zhang, S. Zhang. 'Rational Design of Bubble Bed Reactor by Numerical Simulation'. 7th World Congress on Recovery, Recycling and Re-integration, Sep. 2005, Beijing, China.
35. J. Lu, **L. Yu**, X. Zhang, S. Zhang. 'Simulation of the Circulating Fluidized Coal Gasifier'.

7th World Congress on Recovery, Recycling and Re-integration, Sep. 2005, Beijing, China.

36. J. Lu, **L. Yu**, X. Zhang, S. Zhang. 'Numerical Simulation of Circulating Fluidized Bed Coal Gaisfier I: Reactor Model and Simulation'. The 10nd Annual Meeting for Application of Information Technology and chemical Engineering, 2005, Beijing, China.
37. J. Lu, **L. Yu**, X. Zhang, S. Zhang. 'CFD Simulation of Clean Coal Gasifier for H_2 Product and CO_2 Removal II: Parameters Sensitivity Analysis'. The 2nd Chemical and Biochemical Engineering Annual Meeting, Nov. 2005, Beijing, China.
38. J. Lu, **L. Yu**, X. Zhang, S. Zhang. 'CFD Simulation of Clean Coal Gasifier for H_2 Product and CO_2 Removal I: CFD Model'. The 1st Chemical and Biochemical Engineering Annual Meeting, Nov. 2004, Nanjing, China.

Reports

- ✧ T. Ewing, G. Yorgey, C. Frear, **L. Yu** 'Technologies for Dairy Nutrient Recovery: Evaluation of Low-impact Ammonia Stripping with Bio-Fertilizer Recovery and Support for Technology Decision Making'. 2018. http://s3-us-west-2.amazonaws.com/wp2.cahnrs.wsu.edu/wp-content/uploads/sites/32/2018/12/STAR-N3R14b-web.pdf
- ✧ S. Chen, C. Frear, M. Garcia-Pérez, C. Kruger, …, **L. Yu,** 2018. Advancing Organics Management in Washington State: The Waste to Fuels Technology Partnership 2015-2017 Biennium. Waste 2 Resources, Washington State Department of Ecology Publication No. 18-07-010. Olympia, Washington. 424 pp. June 2018. https://fortress.wa.gov/ecy/publications/documents/1807010.pdf
- ✧ M. Garcia-Pérez, S. Chen, C. Kruger, ..., **L. Yu,** 2017. Technology Research and Extension Related to Anaerobic Digestion of Dairy Manure, 2015-2017 Biennium. A Project Report for the Washington State University Agricultural Research Center and the Washington State Department of Agriculture. 173 pp. http://csanr.wsu.edu/wp-content/uploads/2018/06/Appendix-A-Report_2015-2017.pdf
- ✧ S. Chen, C. Frear, M. Garcia-Perez, J. Jensen, ... , **L. Yu**, and Q. Zhao. The Project for the State of Washington Department of Ecology & Washington State University: 'Advancing Organics Management in Washington State: The Waste to Fuels Technology Partnership'. 2016. Washington State Department of Ecology: https://fortress.wa.gov/ecy/publications/documents/1607008.pdf.
- ✧ S. Chen, C. Frear, M. Garcia-Perez, C. Kruger, ..., **L. Yu**, Q. Zhao, S. Zhang, and T. Zhu. The Project for Washington State University Agricultural Research Center and the Washington State Department of Agriculture: 'Technology Research and Extension for Improved Management of Manure and Agricultural Residues'. 2015. Washington State University's Center for Sustaining Agriculture & Natural Resources: http://csanr.wsu.edu/wp-content/uploads/2016/06/Appendix-A-Report_20150823_FORRESUBMISSION.pdf.
- ✧ **L. Yu**, S. Chen. The Project for the State of Washington Department of Ecology & Washington State University: 'Pilot-project High Solids Anaerobic Digesters (HSAD) —

Enhance Digestion Performance of Green Waste and Mathematical Modeling'. 2013. Washington State Department of Ecology: https://fortress.wa.gov/ecy/publications/publications/1407010.pdf.

- ✧ **L. Yu**, J. Ma, S. Chen. The Project for the State of Washington Department of Ecology & Washington State University: 'Two Novel Floor-Scale Anaerobic Digester Systems for Processing Food Waste Part 2: Moderate Solids Digester System'. 2011. Washington State Department of Ecology: https://fortress.wa.gov/ecy/publications/publications/1207036.pdf.
- ✧ C. Frear, W. Liao, Z. Wang, J. Ma, U. Zaher, T. Ewing, C. Li, **L. Yu** and S. Chen. The Project for Washington State University's Center – Climate Friendly Farming: 'Development of New Digester Technologies for Improved Adoption and Cost Reduction'. 2010, http://csanr.wsu.edu/pages/Climate_Friendly_Farming_Final_Report.
- ✧ U. Zaher, C. Li, **L. Yu**, T. Ewing, S. Chen. The Project for the State of Washington Department of Ecology & Washington State University: 'Producing energy and fertilizer from organic municipal solid waste'. 2009, Washington State Department of Ecology: http://www.ecy.wa.gov/pubs/0907064.pdf.

Funding Award

1. Key Personnel, 'Commodities and Practices to Reduce Greenhouse Gas Emissions in Pacific Island Agriculture and Forestry Systems': Life-Cycle Inventory and Life Cycle Assessment, USDA Partnerships for Climate-Smart Commodities Program, $100,000 of total $5 million. 2023-2028
2. Co-PI, 'Processing Agricultural Biomass into Value-added Products for Enhanced Environmental and Economical Sustainability'. Emerging Research Issues (ERI) for Washington Agriculture 2022 Internal Competitive Grant Program. WSU&WSDA $80,000. 05/01/2023 – 04/30/2025
3. Key Personnel, 'Improving end-of-life management of plastic mulch in strawberry systems': Task 5.4: Life-Cycle Inventory and Life Cycle Assessment. USDA, Specialty Crop Research Initiative (SCRI), Coordinated Agricultural Project (CAP). $80,000 of total $8 million. 10/01/2022 -09/30/2026
4. PI, 'Converting Organic Waste to Biopolymer by Synergizing Anaerobic Digestion and Synthetic Biology'. USDA AFRI: The Small Business Innovation Research (SBIR) Program, Phase II. $650,000. 09/01/2022 – 08/31/2024
5. PI, 'Sequential Hydrothermal Extraction (SeqHTE) for Recovering Bioactive Compounds from Potato Peels and Agricultural By-products'. USDA AFRI: The Small Business Innovation Research (SBIR) Program, Phase I. $175,000. 07/01/2022 – 02/28/2023
6. PI, 'Promote syntrophic association among microbial species through hydrodynamics and deep learning to augment the performance of industrial anaerobic digestion(AD) facilities'. Emerging Research Issues (ERI) for Washington Agriculture 2022 Internal Competitive Grant Program. WSU&WSDA $80,000. 05/01/2022 – 04/30/2024
7. PI, CAHNRS Internship Proposal Application, Spring and summer semester 2022, $3,000.
8. PI, 'Develop a Self-Sustainable Technology to Recover Clean Water, Nutrients and Energy

from Animal Farm Wastewater'. USDA AFRI Foundational and Applied Science Program: b. Water Quantity and Quality. June 10, 2021. $750,000. 01/01/2022 – 12/31/2025

9. PI, CAHNRS Internship Proposal Application, Spring and summer semester 2021, $2,500.
10. Key Personnel, **(Major Contribution)** 'Develop an efficient and cost-effective novel anaerobic digestion system producing high purity of methane from diverse waste biomass' May 14, 2019, DOE, Commercial Trucks and Off-road Applications FOA: Natural Gas, Hydrogen, Biopower, and Electrification Technologies, AOI 1b (Research): Waste-to-Energy, $30,000,000. DE-EE0008808, 10/01/2020 – 10/01/2023

Professional Activities

- ✧ 12/2023 – present *Guest Editor* Journal: Frontiers in Bioengineering and Biotechnology/ Membrane Bioreactors for Advanced Water and Wastewater Treatment
- ✧ 01/2023 – present *Guest Editor* Journal: Frontiers in Bioengineering and Biotechnology/ Bioprocess Engineering: Resource Recovery from Organic Wastes on the way to Carbon Neutrality
- ✧ 2022.10.20 - 2022.11.17 The science advisory panel for proposals submitted to the research-only 2022 Water Quantity and Quality (Q&Q) priority area of the USDA-NIFA Bioenergy, Natural Resources, and Environment (BNRE) program
- ✧ 2022.01- present *Guest Editor* Journal: Fermentation, SI Title: Energy converter-anaerobic digestion
- ✧ 2020.5 - 2020.7 Book reviewer: 'Algal biomass conversion towards biofuels and bioproducts in a biorefinery approach'. Elsevier S&T Books.
- ✧ Journal paper reviewer: *Applied Energy, Bioresource Technology, Biochemical Engineering Journal, International Journal of Hydrogen Engergy, Biotechnology for Biofuels, Industrial & Engineering Chemistry Research, Energy, Water Research, Biomass&Bioenergy, Process Biochemistry, Ecological Economics, Engineering Applications of Computational Fluid Mechanics, International Biodeterioration & Biodegradation, Process Safety and Environmental Protection, Alexandria Engineering Journal, Applied Mathematical Modelling, Journal of Applied Microbiology, Energy for Sustainable Development, Chinese Journal of Chemical Engineering, Environmental Science and Pollution Research, Industrial Crops & Products* etc.
- ✧ 2013.01-06 Organizing committee, China-US Symposium on Biomass and Biogas Technologies and Application, Indianapolis, IN 46241, USA, June 13, 2013
- ✧ 2013.05 Assistant Editor on behalf of Guest Editor Shulin Chen, Journal "Applied Energy", Special Issue - Sustainable Energy and Climate Protection Solutions in Agriculture
- ✧ 2004-2005 Participating in the preparation of 7th World Congress on 3R (reducing waste, reusing and recycling resources and products)

Main responsibilities:

1. Collect and edit papers
2. Organize StEP workshop which solves the E-Waste Problem

Service to WSU

- ✧ Oct. 2023 – Oct. 2026: Graduate Studies Committee at WSU
- ✧ Spring, 2023: Anti-Hazing Advisory Committee at WSU
- ✧ May 2021 – May 2024: Faculty Senator for the Non-Tenure Track Faculty at WSU
- ✧ October 2021 – present: Review Committee Member for Undergraduate Research Scholarship applications at WSU
- ✧ March 1, 2022 – March 6, 2022: Review Committee Member for NSF-funded "Stakeholder-Informed Innovations in the Food-Energy-Water Nexus" Research Experience for Undergraduates (REU) at WSU
    - o 2022. 6.1 – 2022.7.30: Serve as mentor of the undergraduate student, Olivia M. Hunt, for her training in experiments, mathematical model and poster presentation

Professional Societies

- ✧ American Institute of Chemical Engineers (AIChE) membership
- ✧ American Society of Agricultural and Biological Engineers (ASABE) membership
- ✧ Member of the editorial board of Journal of Modern Applied Science
- ✧ Member of the editorial board of Journal of Environmental Management and Sustainable Development
- ✧ Member of the editorial board of Journal of Environment and Ecology
- ✧ International Graduate and Professional Association (iGPSA) membership