

## **LC(Liangcheng) Yang, Assistant Professor**

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### **EDUCATION**

- Ph.D. Agricultural & Biological Engineering, University of Illinois at Urbana-Champaign, 2013.
- M.S. Eng. Civil and Environmental Engineering, University of Tennessee, Knoxville, 2009.
- B.S. Environmental Science, Zhejiang University, Hangzhou, China, 2005.

### **RESEARCH INTERESTS**

My research primary focus on: (1) developing anaerobic digestion technology to manage organic wastes and to produce bioenergy, (2) understanding the effects of air pollutants on human health and developing mitigation methods, and (3) recovering nutrients from waste water using waste materials.

### **PROFESSIONAL AREAS**

- Anaerobic digestion
- Air quality
- Waste management
- Occupational health

### **APPOINTMENTS**

2014.08-present	Assistant Professor, Department of Health Sciences Environmental Health Program, Illinois State University (ISU).
2013.10–2014.08	Postdoctoral Research Associate, Department of Food, Agricultural & Biological Engineering, The Ohio State University (OSU).
2013.08-2013.10	Postdoctoral Research Associate, Department of Agricultural & Biological Engineering, University of Illinois at Urbana-Champaign (UIUC).
2009 – 2013	Research Assistant, Department of Agricultural & Biological Engineering, UIUC.
2011 – 2012	Teaching Assistant, Department of Agricultural & Biological Engineering, UIUC.
2007 – 2009	Research Assistant, Department of Civil and Environmental Engineering, University of Tennessee, Knoxville (UTK).
2005 – 2007	Environmental Engineer, SanHe Environmental Technology & Engineering Ltd. Hangzhou, China.

## RESEARCH PROJECTS

### *Current Research Projects – ISU*

- Anaerobic digestion: Develop a stable and sustainable anaerobic digester system to treat locally produced wastes. Major goals are to: 1. improve system stability; 2. minimize anaerobic digestion effluent; 3. maximize biogas yield; and 4. reduce H<sub>2</sub>S emission.
- Nutrient recovery: Assess the feasibility of using waste ammonia (from wastewater) and carbon dioxide (from biogas) to produce commercial grade ammonium bicarbonate.

### *Previous Research Projects*

- Biogas upgrading: Explored approaches for upgrading biomethane into value added products, such as compressed natural gas and methanol.
- Air pollution control: Developed an integrated biofilter system to removal ammonia and particles from livestock facilities.
- Air pollutant transport and fate: characterized total suspended particulates at the air exhaust of concentrated animal feeding operations; studied the fate of N-containing compounds in biofilters.
- VOCs mitigation: Modeled and experimentally tested competitive adsorption of water vapor and organic vapor mixtures on carbon nanotube bundles.

## GRANTS

### *Under review*

- **L. Yang**, T. Bierma, G. Jin, X. Wang, and Y. Lu. 2016. Biocatalytic and crystal seeding techniques for the recovery of nitrogen from wastewater using waste materials. National Science Foundation. \$330,453.
- D. Kopsell and **L. Yang**. 2016. Estimating the Potential of Diversified Crop Residues and Wastes on Organic Farms for Biogas Production Using Anaerobic Digestion. USDA-SARE Partnership program. \$30,000.
- **L. Yang** and D. Kopsell. 2016. A Novel Cartridge Design for an Anaerobic Digestion System for Organic Farms. USDA-SARE Research and Education program. Preproposal. \$200,000.
- T. Michels and **L. Yang**. 2016. Modular Approach for CAFO Waste-to-Energy Conversion. USDA-NIFA Small Business Innovation Research program. \$153,120.

### *Funded/Accepted*

- **L. Yang**. 2016. Development of a novel anaerobic digestion system with stable biogas production and no liquid waste generation. Illinois State University Cross-disciplinary Grant Development Grant. \$15,000.
- **L. Yang**. 2016-2017. Micro-aeration for hydrogen sulfide removal in recirculating anaerobic digestion system. Illinois State University-University Research Grant. \$5,000.
- **L. Yang**. 2015-2016. Recovery of failed solid-state anaerobic digesters using a partial mixing method. Illinois State University-University Research Grant. \$5,000.

- T. Bierma, **L. Yang**, G. J. et al. 2015. Integrated pilot-scale anaerobic digestion on ISU farm. Proposal was accepted, but the funding is still in the pending status due to state wide budget cut. Illinois EPA. \$1,000,000.

**Not funded**

- **L. Yang** and K. Webster. 2016. Evaluating the Efficacy of UVC Surface Disinfection under Various Environmental Conditions. National Institute for Occupational Safety and Health (NIOSH). \$19,826.
- T. Michels and **L. Yang**. 2015. Modular Approach for CAFO Waste-to-Energy Conversion. USDA-NIFA Small Business Innovation Research program. \$153,120.
- **L. Yang**. 2015. Sustainable farm crop residue management. USDA-SARE Youth Educator program. \$2,000.

**COURSES**

- Water and wastewater treatment. A junior/senior level course (lectures and labs) that covers water quality, wastewater treatment, and environmental and health effects of water contaminants. *ISU*.
- Air quality and pollution control. A senior level course (lectures and labs) that covers indoor and outdoor air quality, pollution control methods, and air borne diseases. *ISU*.
- Renewable energy and agriculture. A junior/senior level course that cover a variety of topics, including corn ethanol, biodiesel, wind energy, solar energy, and many others. *ISU*.
- Occupational Health. A sophomore/junior level course that provides an overview of occupational health, focusing on the recognition and assessment of adverse environmental conditions in the workplace that affect the efficiency, health, and well-being of workers. *ISU*.
- Assisted teaching Indoor Air Quality Engineering. A senior/graduate level course that covers particle mechanics, air pollution control, sampling methods, and indoor health. *Fall, 2011. UIUC*.

Table 1 Course evaluation results at ISU (out of 5.0)

Course	Semester	Enrollment	Excellent teacher	Excellent course
Occupational Health	Fall, 2014	39	4.5	4.2
	Spring, 2015	25	4.7	4.3
	Fall, 2015	39	4.8	4.4
	Spring, 2016	32	4.7	4.4
Water and wastewater treatment	Fall, 2014	20	4.7	4.7
	Fall, 2015	25	4.7	4.6
Air quality and pollution control	Spring, 2015	23	4.6	4.5
	Spring, 2016	20	4.8	4.7
Renewable energy and agriculture	Summer, 2015	11	5.0	4.7
	Spring, 2016	24	4.5	4.4
	Summer, 2016	12	4.6	4.6

## **INDUSTRIAL EXPERIENCE**

Project: Design commercial Flue Gas Desulfurization (FGD) systems for coal-fired power plants.

- Designed pipes, wastewater treatment plant, limestone tank, and FGD spray tower.
- Calculated heat and mass transfer between flue gas and liquid droplets within FGD spray towers (a multi-phase flow system) to predict SO<sub>2</sub> removal efficiency so that optimized FGD system design.
- Assisted project manager in management support, project evaluation, and regulatory compliance.

## **ACADEMIC AWARDS**

- Illinois State University Research Initiative Award. 2017.
- CAST Outstanding Researcher Award (pre-tenure category). College of Applied Science and Technology. ISU. 2016.
- Submission incentive award. Department of Health Sciences. ISU. 2014, 2015, 2016.
- Publication incentive award. College of Applied Science and Technology. ISU. 2015, 2016.
- Boyd-Scott Graduate Research Award–Ph.D. Dissertation Competition Award, First Place, International Annual ASABE (American Society of Agricultural and Biological Engineers) Conference. July, 2013, Kansas City, Missouri.
- Student Paper Award, First Place, Association of Overseas Chinese Agricultural, Biological, and Food Engineers. July, 2013, Kansas City, Missouri.
- Mavis Future Faculty Fellow Award, Engineering College, UIUC, 2012-2013. Benefits include \$5000 award and extensive trainings in proposal writing, presentation, and teaching.
- Ben and Georgeann Jones Graduate Student Scholarship, Department of Agricultural and Biological Engineering, UIUC, 2012.
- Office of Research Travel Grant Fellow Award, ACES College, UIUC, 2012.
- Travel grant to ASABE conference, Department of Agricultural & Biological Engineering, UIUC, 2012.
- Best Poster Awards, Second Place, Grad Student Research Adverts Presentation, Department of Agricultural & Biological Engineering, UIUC, 2011.
- GuangHua Scholarship, Zhejiang University, 2005.
- Student Excellence Award, Third Place, Zhejiang University, 2004 and 2005.

## **COMMUNITY SERVICE**

### ***Peer Reviewing Work***

- Review Editor, *Frontiers in Energy Research-Bioenergy and Biofuel*. 2014–present.
- Contributing Editor of the *Postdoc Journal: Journal of Postdoctoral Research*. 2013–present.
- Manuscript reviewer for the following journals: *Journal of Hazardous materials, Chemosphere, Waste Management, Water Research, Renewable and Sustainable Energy Review, Fuel, Environmental Engineering Science, Journal of the Air & Waste Management Association, Sustainable Environment Research, Biomass Conversion and Biorefinery, Biosystem Engineering, Transactions of the ASABE,*

*International Journal of Agricultural and Biological Engineering, Environmental Science Process and Impacts, Applied Engineering in Agriculture, RSC Advances, Applied microbiology & Biotechnology, Bulletin of Environmental Contamination and Toxicology, Powder technology, Frontier, Wood material science and engineering, Journal of international environmental science technology, and Journal of environmental science health.*

### **Committees**

- Member, Illinois State University Sustainable Water Center Steering Committee, 2016-present.
- Member, Master thesis defense committee for a graduate student at Univ. of Illinois at Urbana-Champaign, 2014-2016.
- Membership director, Association of Overseas Chinese Agricultural Biological Food Engineers. 2014-present.
- Voting member, American Society of Agricultural and Biological Engineers (ASABE) technical section SE-305 Environment Air Quality, 2012 –present.
- Voting member, ASABE technical section: SE-302 Environment of Animal Structures, 2012 -present.
- Voting member, ASABE committee: P-122 Graduate Student Research Award, 2013 –present.

### **CERTIFICATES**

- Certificate of completion of Design, Align, Refine, and Teach Online (DART) program. ISU.
- Certificate of completion of Independent Applying the Quality Matter Rubric (APPQMR).
- Certificate in Foundations of Teaching. UIUC.
- National Instrument Certified LabVIEW Associate Developer (CLAD).
- Fundamental Engineer (FE) in Environmental Engineering.

### **MEMBERSHIP ACTIVITIES**

- Illinois Environmental Health Association, Member, 2014-present.
- American Society of Agricultural & Biological Engineering, Member, 2009-present.
- Association of Overseas Chinese Agricultural Biological Food Engineers, Member, 2012-present.
- Air & Waste Management Association, Student Member, 2007-2009.

### **PRODUCTS**

#### ***Journal Articles***

1. **Yang, L.**, X. Ge, and Y. Li. 2016. Recovery of failed solid-state anaerobic digesters. *Bioresource Technology*. 214: 866-870.
2. Jin, G., T. Biema, and **L. Yang**. 2016. Cap-and-Trade: Understanding and teaching a market-based approach to natural resource allocation. *Natural Sciences Education*. 45:1-11.
3. Cui, S., **L. Yang**, J. Wang, X. Wang. 2016. Fabrication of a sensitive gas sensor based on

- PPy/TiO<sub>2</sub>nanocomposites films by layer-by-layer self-assembly and its application in food storage. *Sensors and Actuators B*. 233: 337–346.
4. Yang, X., J. Lee, Y. Zhang, X. Wang, and **L. Yang**. 2015. Concentration, Size, and Density of Total Suspended Particulates at the Air Exhaust of Concentrated Animal Feeding Operations. *Atmospheric Environment*. 1-10.
  5. **Yang, L.**, F. Xu, X. Ge, and Y. Li. 2015. Challenges and strategies for solid-state anaerobic digestion of lignocellulosic biomass. *Renewable and Sustainable Energy Reviews*. 44: 824-834.
  6. Sheets, J., **L. Yang**, X. Ge, Z. Wang, and Y. Li. 2015. Beyond land application: Emerging technologies for the treatment and reuse of anaerobically digested agricultural and food waste. *Waste Management*. 44: 94–115.
  7. Lin, L., **L. Yang**, and Y. Li. 2015. Effect of feedstock components on thermophilic solid-state anaerobic digestion of yard trimmings. *Energy and Fuels*. 29 (6), 3699–3706.
  8. Zhu, J., M. Han, G. Zhang, and **L. Yang**. 2015. Co-digestion of spent mushroom substrate and corn stover for methane production via solid-state anaerobic digestion. *Journal of Renewable and Sustainable Energy* 7 (2), 023135.
  9. Jiang D., L. Danhua, S. Wang, L. Tian, and **L. Yang**. 2015. Additional Yaw Moment Control of a 4WIS and 4WID Agricultural Data Acquisition Vehicle. *International Journal of Advanced Robotic Systems*. 12: 78.
  10. **Yang, L.**, X. Ge, C. Wang, F. Yu, and Y. Li. 2014. Progress and perspectives in converting biogas to transportation fuels. *Renewable and Sustainable Energy Reviews*. 40:1133-1152.
  11. Zhu J.<sup>+</sup>, **L. Yang**<sup>+</sup>, and Y. Li. 2014. Comparison of premixing methods for solid-state anaerobic digestion of corn stover. *Bioresource Technology*. 175: 430-435.
  12. Ge, X., **L. Yang**, J.P. Sheets, Z. Yu, and Y. Li. 2014. Biological conversion of methane to liquid fuels: status and opportunities. *Biotechnology Advances*. 32: 1460-1475.
  13. **Yang, L.** and Y. Li. 2014. Anaerobic digestion of giant reed for methane production. *Bioresource Technology*. 171:233-239.
  14. Cui, S., J. Wang, **L. Yang**, J. Wu, and X. Wang. 2015. Qualitative and quantitative analysis on aroma characteristics of ginseng at different ages using E-nose and GC-MS combined with chemometrics. *Journal of Pharmaceutical and Biomedical Analysis*. 102: 64-77.
  15. Cui, S., **L. Yang**, J. Wang, and X. Wang. 2014. Taste characteristics based quantitative and qualitative evaluation of ginseng adulteration. *Journal of the Science of Food and Agriculture*. DOI: 10.1002/jsfa.6858.
  16. Shen, C., **L. Yang**, X. Wang, Y. Jiang, and Y. Yao. 2014. Predictive performance of a wastewater source heat pump using artificial neural networks. *Building Services Engineering Research and Technology*. DOI: 10.1177/0143624414547966.
  17. Lin, L., **L. Yang**, F. Xu, F. C. Michel, and Y. Li. 2014. Comparison of solid-state anaerobic digestion and composting of yard trimmings with effluent from liquid anaerobic digestion. *Bioresource Technology*. 169: 439–446.
  18. **Yang, L.**, A.D. Kent, X. Wang, T.L. Funk, R.S. Gates, and Y. Zhang. 2014. Moisture effects on gas-phase biofilter ammonia removal efficiency, nitrous oxide generation and microbial communities. *Journal of Hazardous Materials*. 271: 292–301.
  19. **Yang, L.** and C. Shen. 2014. Integration of wastewater source heat pump and solid-state anaerobic digestion for residential waste treatment and energy production. *Journal of Postdoc Research*. 2:1–6.
  20. Shen, C, C. Cirone, **L. Yang**, Y. Jiang, and X. Wang. 2014. Characteristics of fouling development in shell-and-tube heat exchanger: Effects of velocity and installation location. *International Journal of Heat and Mass Transfer*. 77: 439–448.
  21. Shen, C., **L. Yang**, X. Wang, Y. Jiang, and Y. Yao. 2014. An experimental and numerical study of a de-

- fouling evaporator used in a wastewater source heat pump. *Applied Thermal Engineering*. 70: 501–509.
22. **Yang, L.**, X. Wang, T.L. Funk. 2014. Strong influence of medium pH condition on gas-phase biofilter ammonia removal, nitrous oxide generation and microbial communities. *Bioresource Technology*. 152: 74–79.
  23. Jiang, D., **L. Yang**, L. Tian, F. Gao, L. Li. 2014. Development of a 3D ego-motion estimation system for an autonomous agricultural vehicle. *Biosystem Engineering*. 121:150–159.
  24. **Yang, L.**, X. Wang, T.L. Funk, S. Shi, R.S. Gates and Y. Zhang. 2013. Moisture monitoring and control in gas-phase biofilters to achieve high ammonia removal efficiency and low nitrous oxide generation. *Transactions of the ASABE*. 56(5): 1895–1903.
  25. **Yang, L.**, X. Wang, T.L. Funk, R.S. Gates and Y. Zhang. 2013. Impedance based moisture sensor design and test for gas-phase biofilter applications. *Transactions of the ASABE*. 56(4): 1613–1621.
  26. **Yang, L.**, X. Wang, T.L. Funk, R.S. Gates and Y. Zhang. 2012. Transport and fate of N-containing compounds in gas-phase biofilter: A swing test to mitigate ammonia. *Transactions of the ASABE*. 55(5): 1951–1958.
  27. **Yang, L.**, X. Wang, T.L. Funk, and R.S. Gates. 2011. Biofilter media characterization and airflow resistance test. *Transactions of the ASABE*. 54 (3): 1127–1136.
  28. Agnihotri S., PC. Kim, Y. Zheng, JB. Mota, and **L. Yang**. 2008. Regioselective competitive adsorption of water and organic vapor mixtures on pristine single-walled carbon nanotube bundles. *Langmuir*. 24(11): 5746–5754.
  29. **Yang, L.**, PC. Kim, H.M. Meyer, and S. Agnihotri. 2009. Aging of nanocarbons in ambient conditions: Probable metastability of carbon nanotubes. *Journal of Colloid and Interface Science*. 338(1):128–134.
  30. He, W., T. Tu, D. Lin, and **L. Yang**. 2005. Absorption and accumulation of polycyclic aromatic hydrocarbons (PAHs) in tea plant and its effect on chemical components in tea leaves. *Journal of Tea*. 31(4). In Chinese.

+ Co-first author.

### **Book Chapter**

1. Ge, X., **L. Yang**, and J. Xu. 2014. Cell immobilization: Fundamentals, Strategies and Applications. Wiley-Blackwell Biotechnology Series.
2. **L. Yang**, and X. Ge. 2016. Biogas and syngas upgrading. Elsevier Book series on Advance in Bioenergy.

### **Fact Sheets**

1. **Yang, L.**, and Y. Li. 2014. Biogas Cleaning and Upgrading Technologies. *OSU Extension Fact Sheet, AEX 653.1-14*.
2. Li, Y. and **L. Yang**. 2014. Converting Spent Wheat Straw from House Stall into Methane. *OSU Extension Fact Sheet, AEX 653-14*.
3. **Yang, L.**, and Y. Li. 2014. Converting biogas to transportation fuels. *OSU Extension Fact Sheet, AEX 653.2-14*.

### **Patent**

1. Shi, Y., X. Hu, X. Yuan, Y. Fu, T. Tan and **L. Yang**. 2006. Regeneration Device for Dual Alkali Flue Gas Desulfurization System. China Patent Application Serial No. ZL2005200154576. Issued. In Chinese.

### ***Conferences Proceedings and Presentations***

1. **L. Yang**. 2016. Development of a novel anaerobic digestion system with stable biogas production and no liquid waste generation. Annual ASABE meeting. Orlando, FL, July 23-26.
2. Dietrich, A., A. Kottke, and **L. Yang**. 2016. Recovery of failed solid state anaerobic digestion fed with corn stover. Illinois State University Research Symposium.
3. **L. Yang**, X. Ge, C. Wang, F. Yu, and Y. Li. 2015. Pathways for converting biogas to transportation fuels. Annual ASABE meeting. New Orleans, LA, July 26-29. Invited.
4. **L. Yang**. 2014. Sewage treatment using anaerobic digestion and effluent handling options. Illinois Environmental Health Association Annual Educational Conference. Oct 2-3. Peoria, IL. Invited.
5. Zhu, J., **L. Yang**., Y. Li. 2014. Effects of premixing methods of feedstock and inoculum on solid-state anaerobic digestion of corn stover. 2014 Annual ASABE meeting, Montreal, QC Canada. Jul 13-16, 2014.
6. Lin, L., **L. Yang**, Y. Li. 2014. Side-by-side comparison of solid-state anaerobic digestion and composting of yard trimmings with effluent from liquid anaerobic digestion. 2014 Annual ASABE meeting, Montreal, QC Canada. Jul 13-16, 2014. Paper No. 141897526.
7. **L. Yang**, X. Wang, T.L. Funk, and A. D. Kent. 2013. Effects of Media pH Conditions on Gas-Phase Biofilter Ammonia Removal, Nitrous Oxide Generation and Microbial Communities. *In Proc. of 2013 International Symposium on Animal Environment and Welfare*, Chongqing, China, Oct 19-22, 2013, pp 295–308.
8. **Yang, L.**, X. Wang, and T.L. Funk. 2013. Moisture Effects on Biofilter Ammonia Removal and Nitrous Oxide Generation. *In ASABE 2013 Annual International Meeting*. July 21–24, Kansas City, MO.
9. **Yang, L.** 2012. Moisture control: The Key to Biofilter Success. *In Ventilation and Air Quality for Livestock Systems Field Day Workshop*. University of Illinois Extension. Oct 25, Urbana, IL.
10. 2012. Frontiers in Education Conference. Oct 3-6, Seattle, WA. (Sponsored by Mavis Future Faculty Fellowship).
11. **Yang, L.**, X. Wang, and T.L. Funk. 2012. A Feasible Moisture Sensor. *In ASABE 2012 Annual International Meeting*. July 29–Aug 1, Dallas, TX.
12. **Yang, L.**, X. Wang, and T.L. Funk. 2011. NH<sub>3</sub> Removal Biofilter Kinetic Study: The role of Nitrate, Nitrite and Ammonium. *In ASABE 2011 Annual International Meeting*. August 7–10, Louisville, KY.
13. Funk, T.L., X. Wang, R.E. Nicolai, and **L. Yang**. 2011. Integrated Project to Improve Moisture Control and Practical Design of Biofilters for Treating Exhaust Air from Livestock Buildings – Second Year Report. *In AFRI Air Quality Project Directors Meeting*. June 7, Washington DC.
14. Funk, T.L., X. Wang, and **L. Yang**. 2010. Integrated Project to Improve Moisture Control and Practical Design of Biofilters for Treating Exhaust Air from Livestock Buildings – First Year Report. *In AFRI Air Quality Project Directors Meeting*. August 23, Amarillo, TX.
15. **Yang, L.**, X. Wang, T.L. Funk, R.S. Gates, and J. Nan. 2010. Biofilter Media Characterization and Airflow Resistance Test. *In ASABE 2010 Annual International Meeting*. June 20–23, Pittsburg, PA.
16. Agnihotri, S., J.P.B., Mota, P. Kim, and **L. Yang**. 2009. Regioselective Competitive Adsorption of Water and Organic Vapor Mixtures on Heterogeneous Bundles of Single-Walled Carbon Nanotube: Experimental and Simulation Study. AIChE. New York.
17. Agnihotri S., Y. Zheng, P.C. Kim, and **L. Yang**. 2008. Fate of Nanocarbons in Urban Atmosphere. *In 236th ACS Annual National Meeting & Exposition*. August 17-21, Philadelphia, PA.

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