

ENERGY RESEARCH NEWS

The Office of Energy and Environment and the Office of Student Life have announced this year's winners of the Coca-Cola Sustainability Grant. The winners are (BBRL members are underlined):

- **Eric Van Deusen** for his study "Urban Blooms Vertical Garden and SEEDS Sustainability." His plan is to construct the first Living Wall System (LWS) at Ohio State. The project will evaluate the system as a tool of sustainable design.
- **Johnathon Sheets, Adam Khalaf**, Alexandria Jensen and Braydi McPherson for the project "Sustainable Conversion of Organic Waste from Campus into Fuels and Chemicals." The group's primary goal is to improve overall campus sustainability by diverting organic wastes from landfills to anaerobic digestion systems.
- **Laura Kington** for research to explore ways to build a sustainable food system through university purchasing. Through the grant a group of Ohio State students will participate in Ohio's largest sustainable food and farm conference. The project's goal is to identify and investigate viable options which might exist in the state of Ohio.
- **Yu Dang, Xiaoying Zhao**, Amir Yousif, Elizabeth Wagner and Kathryn Van Winkle for the project titled "Production of biodiesel and polyurethane (PU) foams from campus wastes." The project will focus on the value-added utilization of campus wastes, especially used cooking oil and PET bottles.

BBRL NEWS

Juliana Vasco Correa passed her Ph.D. candidacy exam on December 5, 2014. Congratulations to Juliana!

Dr. Zhiwu Wang received a Tenure track Assistant Professor Position offer from Virginia Tech in the Department of Environmental Engineering.

Food, Agricultural, and Biological Engineering Building had an open house December 19, 2014. Pictures below show part of the new BBRL lab.



BBRL MEMBER SPOTLIGHT

Wenxian Zhang-Wenxian is a principal investigator in Engineering Research Center of Industrial Microbiology, Ministry of Education at Fujian Normal University. He has been studying the epigenetic regulation of biosynthetic processes of antitumor ganoderic acids. He was appointed to go abroad for advanced study by Fujian provincial Party Committee Organization Department. He happily joined the BBRL directed by Dr. Yebo Li as a visiting scholar in October 2014. His primary research interests focus on bioconversion to produce bioenergy.

JOURNAL CLUB/GROUP SEMINAR UPDATE

The Journal Club had one meeting in December:

- **Fuqing Xu**- "Nonenzymatic Sugar Production from Biomass Using Biomass-Derived γ -Valerolactone", *Science* 343, 277 (2014).

GROUP SEMINAR

One group seminar was held in December:

- **Juliana Vasco Correa** gave a presentation about her proposal for Ph.D. dissertation titled "Development of an integrated biological process for the conversion of miscanthus into biofuels."

Upcoming events, deadlines, or grants

- **Spring Fees** payment due: January 5, 2015
- **Spring course** registration due: January 16, 2015
- **\$500 late registration fee** begins: January 24, 2015
- **OARDC SEEDS** proposal: February 4, 2015

BBRL RESEARCH

2014 Peer Reviewed Journal Publications

1. Tong, X., Luo, X., Li, Y. 2015. Development of Blend Films from Soy Meal Protein and Crude Glycerol-Based Waterborne Polyurethane. *Industrial Crops and Products*. (IF:3.208)
Photo.elsoar.com
2. Park, S., Li, Y. 2015. Integration of biological kinetics and computational fluid dynamics to model the growth of *Nannochloropsis salina* in an open channel raceway. *Biotechnology & Bioengineering*. In press. (IF: 4.164).
3. Ge, X., Matsumoto, T., Keith, L. 2015. Fungal pretreatment of albizia chips for enhanced biogas production by solid-

- state anaerobic digestion. *Energy and Fuel*. In press. (IF: 2.733).
4. Bao, Z., Lu, Y., Han, J., Li, Y., Yu, F. 2015. Highly active and stable Ni-based bimodal pore catalyst for dry reforming of methane. *Applied Catalysis A: General* 491 (2015) 116–126
 5. Chai M., Bellizzi, M., Wan, C., Cui, Z., Li, Y., Wang, G. L. 2015. The NAC transcription factor OsSWN1 regulates secondary cellwall development in *oryza sativa*. *J. Plant Bio.* 58:1-8.
 6. Zhu, J., Yang, L., Li, Y. 2015. Comparison of premixing methods for solid-state anaerobic digestion of corn stover. *Bioresource Technology* 175: 430–435. IF: 5.039.
 7. Hu, S., Li, Y. 2015. Production of polyols and waterborne polyurethane dispersions from biodiesel-derived crude glycerol. *Journal of Applied Polymer Science* 132(6). IF: 1.40
 8. Ge, X., Yang, L., Sheets, J.P., Yu, Z.T., Li, Y. 2014. Biological conversion of methane to liquid fuels: status and opportunities. *Biotechnology Advances* 32: 1460–1475 IF: 8.905
 9. Li, C., Lu, X., Li, T., Tong, X., Li, Y. 2014. Polyurethane foams based on crude glycerol-derived biopolyols: one-pot preparation of biopolyols with branched fatty acid ester chains and its effects on foam formation and properties. *Polymer* 55: 6529-6538.
 10. Lee, Y.L., Luo X., Hu, S, Li, Y., Buchheita, R. G. 2014. Corrosion protection studies of crude glycerol-based waterborne polyurethane coating on steel substrates. *ECS Transactions*, 61 (20) 1-14.
 11. Xu, F., Wang, Z. Li, Y. 2014. Predicting the methane yield of lignocellulosic biomass in mesophilic solid-state anaerobic digestion based on feedstock characteristics and process parameters. *Bioresource Technology* 173:168-176. IF: 5.039.
 12. Li, Y. F., Nelson, M. C., Chen, P. H., Graf, J., Li, Y., Yu, Z. 2014. Comparison of the microbial communities in solid-state anaerobic digesters (SS-ADs) operated at mesophilic and thermophilic temperatures. *Applied Microbiology and Biotechnology*. IF:3.69.
 13. Yang, L., Li, Y. 2014. Anaerobic digestion of giant reed for methane production. *Bioresource Technology* 171: 233-239. IF: 5.039
 14. Yang, L., Ge, Xumeng, Wan, C, Yu, F., Li, Y. 2014. Progress and perspectives in converting biogas to transportation fuels. *Renewable & Sustainable Energy Reviews* 40: 1133-1152. IF: 5.51
 15. Lin, Y., Ge, X., Li, Y. 2014. Solid-state anaerobic co-digestion of spent mushroom substrate with tree trimmings and wheat straw for biogas production. *Bioresource Technology* 169:468-474. IF: 5.039
 16. Lin, L, Yang L., Xu, F., Michel F. C., Li, Y. 2014. Side-by-side comparison of solid-state anaerobic digestion and composting of yard trimmings with effluent from liquid anaerobic digestion. *Bioresource Technology* 169:439-446. IF: 5.039
 17. Ge, X., Matsumoto, T, Li, Y. 2014. Biogas energy production from tropical biomass wastes by anaerobic digestion. *Bioresource Technology* 169:38-44. IF: 5.039
 18. Xu, F., Wang, Z. W., Tang, L., Li, Y. 2014. A mass diffusion-based interpretation of the effect of total solids content on solid-state anaerobic digestion of cellulosic biomass. *Bioresource Technology*. 167: 178–185. IF: 5.039
 19. Hu, S., Li, Y. 2014. Polyols and polyurethane foams from acid-catalyzed biomass liquefaction by crude glycerol: effects of crude glycerol impurities. *Journal of Applied Polymer Science* 131(18): 9054-9062. IF: 1.40
 20. Luo, X., Li, Y. 2014. Synthesis and characterization of polyols and polyurethane foams from PET waste and crude glycerol. *Journal of Polymers and the Environment* 22(3): 318-328. IF: 1.50
 21. Hu, S., Li, Y. 2014. Polyols and polyurethane foams from base-catalyzed liquefaction of lignocellulosic biomass by crude glycerol: effects of crude glycerol impurities. *Industrial Crops and Products*. 57: 188-194. IF: 3.208
 22. Hu, S, Li, Y. 2014. Polyols and polyurethane foams from two-step sequential liquefaction of lignocellulosic biomass by crude glycerol. *Bioresource Technology*. 161:410–415. IF: 5.039
 23. Zheng, Y., Zhao, J., Xu, F., Li, Y. 2014. Pretreatment of lignocellulosic biomass for enhanced biogas production. *Progress in Energy and Combustion Science*: 42:35-53. IF: 16.909
 24. Gómez, E.F., Luo, X., Li, C., Michel F.C., Li, Y. 2014. Biodegradability of crude glycerol-based polyurethane foams during composting, anaerobic digestion and soil incubation. *Polymer Degradation and Stability* 102:195-203. IF: 2.63
 25. Zhao, J., Ge, X. Vasco Correa J., Li, Y. 2014. Fungal pretreatment of unsterilized yard trimmings for enhanced methane production by solid-state anaerobic digestion. *Bioresource Technology* 158: 248–252. IF: 5.039.
 26. Shi J, Xu F., Wang Z., Stiverson, J. A., Yu Z. Li, Y. 2014. Effects of microbial and non-microbial factors of liquid anaerobic digestion effluent as inoculum for solid-state anaerobic digestion of corn stover. *Bioresource Technology*. 157: 188–196. IF: 5.039.
 27. Zhao, J., Zheng, Y., Li, Y. 2014. Fungal pretreatment of yard trimmings for enhancement of methane yield from solid-state anaerobic digestion. *Bioresource Technology*. 156: 176-181. IF: 5.039

28. Hu, S., Luo, X., Li, Y. 2014. Polyols and polyurethanes from the liquefaction of lignocellulosic biomass. *ChemSusChem* 7: 66–72. IF: 7.12
29. Zhu, J., Zheng, Y., Xu, F., Li, Y. 2014. Solid-state anaerobic co-digestion of hay and soybean processing waste for biogas production. *Bioresource Technology* 154:240-247. IF: 5.039
30. Wang, Z. W., Li, Y. 2014. A theoretical derivation of the Contois equation for kinetic modeling of the microbial degradation of insoluble substrates. *Biochemical Engineering Journal*. 82: 134-138. IF: 2.368
31. Sheets, J., Ge, X., Park, Y. S., Li, Y. 2014. Effect of outdoor conditions on *Nannochloropsis salina* cultivation in artificial seawater using nutrients from anaerobic digestion effluent. *Bioresource Technology*. 152:154-161. IF: 5.039

Accepted with minor/major revision

32. Yang, L., Xu, F., Ge, X., Li, Y. 2015. Solid-state anaerobic digestion of lignocellulosic biomass: challenges and strategies to resolve them. *Renewable & Sustainable Energy Reviews*. IF: 5.51
33. Luo, X., Tong, X., Li, Y. 2015. Crude glycerol-based multi-branched polyols and waterborne polyurethane coatings. *Progress in Organic Coatings*. IF: 1.848.
34. Sheets, J. P., Ge, X., Li, Y. 2015. Effect of limited air exposure and comparative performance between thermophilic and mesophilic solid-state anaerobic digestion of switchgrass. *Bioresource Technology*. IF: 5.039

Submitted

35. Lin, Y., Ge, X., Liu, Z., Li, Y. 2015. Integration of Shiitake cultivation and solid-state anaerobic digestion for utilization of woody biomass. *Bioresource Technology*. IF: 5.039
36. Sheets, J. P., Yang, L., Ge, X., Wang, Z., Li, Y. 2015. Beyond land application: Emerging technologies for the treatment and reuse of anaerobically digested agricultural and food waste. *Renewable & Sustainable Energy Reviews*. IF: 5.51

2014 Dissertation/Thesis

- **Stephen Park**, 2014. Numerical and procedural methods to improve the performance of an open channel raceway for *Nannochloropsis salina* cultivation. Ph.D. Dissertation, The Ohio State University, Columbus, Ohio.
- **Fuqing Xu**, 2014. Experimental study and modeling of solid-state anaerobic digestion for enhanced methane production from lignocellulosic biomass. Ph.D. Dissertation, The Ohio State University, Columbus, Ohio.

- **Xinjie Tong**, 2014. Production and characterization of crude-glycerol-based waterborne polyurethanes and their derived blend films with protein. M.S. Thesis. The Ohio State University, Columbus, Ohio.
- **Siam Racharaks**, 2014. Cultivation of *Nannochloropsis salina* and *Dunaliella tertiolecta* using shale gas flowback water and anaerobic digester effluent as cultivation medium. M.S. Thesis. The Ohio State University, Columbus, Ohio.

2014 Extension Fact Sheet

1. Li, Y., Wicks, M. 2013. Fungal pretreatment of corn stover fractions for ethanol production, OSU Extension Fact Sheet, AEX 651.1-13.
2. Li, Y., Yang, L. 2014 Converting spent wheat straw from horse stalls into methane. OSU Extension Fact Sheet, AEX 653-14.
3. Yang, L., Li, Y. 2014. Biogas cleaning and upgrading technologies. OSU Extension Fact Sheet, AEX 653.1-14.
4. Li, Y., Yang, L. 2014 Converting biogas to transportation fuels. OSU Extension Fact Sheet, AEX 653.2-14.

2014 Conference Presentation

1. Li, Y. 2014. Fungal pretreatment of lignocellulosic biomass for biofuel and bioenergy production. 2014 Institute of Biological Engineering (IBE) Annual Conference. Lexington, KY. March 6-8, 2014.
2. Luo, X., Li, Y. 2014. Synthesis and characterization of crude glycerol derived multi-armed epoxy compounds. 2014 American Chemical Society National Meeting and Exposition. Dallas, TX. March 16-20, 2014.
3. Lin, L., Yang, L., Xu, F., Li, Y. 2014. A side-by-side comparative study of solid-state anaerobic digestion and composting using yard waste and liquid anaerobic digestion effluent. 2014 OARDC Annual Conference. Wooster, OH. April 24, 2014.
4. Tong, X., Luo, X., Li, Y. 2014. Development of Waterborne Polyurethane Film from Soymeal and Crude Glycerol. 2014 OARDC Annual Conference. Wooster, OH. April 24, 2014.
5. Luo, X., Tong, X., Li, Y. 2014. Waterborne polyurethane coatings from crude glycerol-based multi-branched polyols. 2014 OARDC Annual Conference. Wooster, OH. April 24, 2014.
6. Yang, L., Zhu, J., Li, Y. 2014. Effects of premixing and recovery methods on solid-state anaerobic digestion of corn stover. 2014 OARDC Annual Conference. Wooster, OH. April 24, 2014.
7. Lin, Y., Ge, X., Li, Y. 2014. Co-digestion of spent mushroom substrate, yard waste and wheat straw for

- enhanced solid-state anaerobic digestion. 2014 OARDC Annual Conference. Wooster, OH. April 24, 2014.
8. Park, S., Li, Y. 2014. Integrated computational fluid dynamics model for open pond cultivation of *Nannochloropsis salina* using phase change material to increase carbon dioxide retention and thermal stability. 2014 Annual ASABE meeting, Montreal, QC Canada. Jul 13-16, 2014.
 9. Lin, Y., Ge, X., Li, Y. 2014. Co-digestion of spent mushroom compost, yard waste and wheat straw for enhanced solid-state anaerobic digestion. 2014 Annual ASABE meeting, Montreal, QC Canada. Jul 13-16, 2014. Paper No. 141897552.
 10. Lin, L., Yang, L., Li, Y. 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.
 11. Racharaks R., Ge, X., Li, Y. 2014. Integration of shale gas wastewater treatment with microalgae-based biofuel production. 2014 Annual ASABE meeting, Montreal, QC Canada. Jul 13-16, 2014.
 12. Xu, F., Wang, Z., Li, Y. 2014. Mathematical modeling of solid-state anaerobic digestion for methane production. 2014 Annual ASABE meeting, Montreal, QC Canada. Jul 13-16, 2014. Paper No. 141909527
 13. Vasco Correa J., Li, Y. 2014. Effect of harvest date on methane production by solid-state anaerobic digestion of *Miscanthus sinensis*. 2014 Annual ASABE meeting, Montreal, QC Canada. Jul 13-16, 2014.
 14. Zhu, J., Yang, L., Li, Y. 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.

Editors

Yu Dang (dang.115@osu.edu)

Juliana Vasco Correa (vascocorrea.1@osu.edu)

Happy
New Year

2015