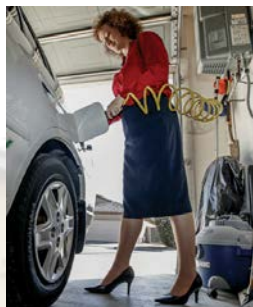


## ENERGY RESEARCH NEWS

### Methane as a transportation fuel

Even though natural gas possesses a relatively low energy density in comparison with gasoline and diesel fuels, it represents a fuel with the potential to disproportionately impact our transportation sector. On paper, gasoline and natural gas have no comparison with an equivalent volume of gasoline able to propel a car ~1000x as far as natural gas at ambient pressures and temperatures; however, natural gas burns cleaner and on a per mile basis is ~50% cheaper. In light of this, researchers are working on new technologies (e.g., adsorbate materials such as activated carbon and metal-organic frameworks) to enable storage of useful volumes of natural gas at close to ambient temperatures and pressures. Additionally, fueling infrastructure options are being studied further, including options such as home compressors which would connect to existing home natural gas lines. [DOI: 10.1126/science.346.6209.538](https://doi.org/10.1126/science.346.6209.538)



## BBRL NEWS

**Dr. Stephen Park** left our lab to start his new position as postdoctoral scholar in Southern Illinois University. We wish him the best in his new career!

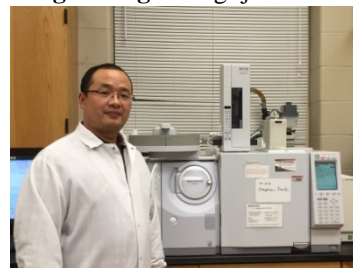


2014 **Annual Renewable Energy Workshop** was held on November 12, 2014 at Fisher Auditorium of OARDC. Presentations can be accessed [here](#).

BBRL Alumni **Dr. Liangcheng Yang** and his colleagues at Illinois State University received a \$1 million grant from Illinois EPA to build a pilot scale farm digester on campus.

## BBRL MEMBER SPOTLIGHT

**Feng Wang**- Feng joined BBRL as a visiting scholar in September 2014. He received his Ph.D. in Food Science in 2007 from Hunan Agricultural University. After working as a lecturer, he became an associate professor in 2009 and his research focused on the food and food



byproducts utilization. He is currently working with Dr. Fuqing Xu on anaerobic digestion of agro-wastes. In the near future, he is interested in doing research in the fields of lignocellulosic materials pretreatment. In his leisure time, he likes playing badminton and ping pong.

## JOURNAL CLUB/GROUP SEMINAR UPDATE

The Journal Club had one meeting in November:

- **Xumeng Ge**- “Direct, Nonoxidative Conversion of Methane to Ethylene, Aromatics, and Hydrogen”, *Science* 344,616 (2014).

## GROUP SEMINAR

One group seminar was held in November:

- **Stephen Park** gave a presentation on his project about lignin pyrolysis.

## Upcoming events, deadlines, or grants

- FASE New **Building Open House** December 19th from 3:30pm – 5:00pm
- **BBRL Christmas Party** December 23, 2014
- 2015 **ASABE Annual International Meeting** Abstract Submission: December 19, 2014
- **OARDC SEEDS** proposal: February 4, 2015
- **Spring course** registration due: January 16, 2015
- **Spring Fees** Payment due: January 5, 2015

## BBRL RESEARCH

### 2014 Peer Reviewed Journal Publications

1. 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* (IF: 4.164). In press.
2. 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.



3. Ge, X., Yang, L., Sheets, J., Yu, Z.T., Li, Y. 2014. Biological conversion of methane to liquid fuels: status and opportunities. *Biotechnology Advances* 32: 1460–1475 **IF: 8.905**
4. 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.
5. 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.
6. 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.**
7. Hu, S., Li, Y. 2014. Production of polyols and waterborne polyurethane dispersions from biodiesel-derived crude glycerol. *Journal of Applied Polymer Science*. **IF: 1.40**
8. 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.**
9. Yang, L., Li, Y. 2014. Anaerobic digestion of giant reed for methane production. *Bioresource Technology* 171: 233-239. **IF: 5.039**
10. 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**
11. 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**
12. 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**
13. 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**
14. 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**
15. 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**
16. 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**
17. 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**
18. 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**
19. 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**
20. 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**
21. 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.**
22. 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.**
23. 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**
24. Hu, S., Luo, X., Li, Y. 2014. Polyols and polyurethanes from the liquefaction of lignocellulosic biomass. *ChemSusChem* 7: 66–72. **IF: 7.12**
25. 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**
26. 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**



27. 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

28. Ge, X., Matsumoto, T., Keith, L. 2014. Fungal pretreatment of albizia chips for enhanced biogas production by solid-state anaerobic digestion. *Energy and Fuel*. IF: 5.039.

29. Yang, L., Xu, F., Ge, X., Li, Y. 2014. Solid-state anaerobic digestion of lignocellulosic biomass: challenges and strategies to resolve them. *Renewable & Sustainable Energy Reviews*. IF: 5.51

30. Luo, X., Tong, X., Li, Y. 2014. Crude glycerol-based multi-branched polyols and waterborne polyurethane coatings. *Progress in Organic Coatings*. IF: 1.848.

31. Tong, X., Luo, X., Li, Y. 2014. Development of Blend Films from Soy Meal Protein and Crude Glycerol-Based Waterborne Polyurethane. *Industrial Crops and Products*. (IF:3.208)

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](mailto:dang.115@osu.edu))

Juliana Vasco Correa ([vascocorrea.1@osu.edu](mailto:vascocorrea.1@osu.edu))

