Optimization of Acidogenic Anaerobic Wastewater Treatment with The Potential for Water Reclamation

Basic Information

Title:	Optimization of Acidogenic Anaerobic Wastewater Treatment with The Potential for Water Reclamation
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Descriptors:	
Principal Investigators:	Baikun Li

Publications

1. Y. Sharma, and B.Li. Hydrogen production from organic contaminants in batch-mode and continuous mode. Bioresource Technology (In review). Submitted: November 2008.
2. Y. Sharma , B. Li. Optimization of hydrogen production from organic wastewaters from experimental and kinetic approaches. International Journal of Hydrogen Energy (In press).
3. Y. Sharma, and B.Li. Optimization of hydrogen production treating organic contaminants. Water Environmental Federation Technical Exhibition and Conference (WEF-TEC), Chicago IL, Oct. 2008. (Won the First-Prize in Poster Session).
4. D. Jiang, Y. Sharma, B. Li, M. Curtis. Bioenergy production from wastewater treatment. Water Environmental Federation (WEF) Sustainability Conference, DC. June 2008.
5. Y. Sharma, and B.Li. Optimization of hydrogen production in anaerobic acidogenic phase and electricity generation in MFCs. ACS Annual Conference. March 2010.
6. Y. Sharma, and B.Li. Co-metablism of biodiesel waste to clean energy. Water Environmental Federation Technical Exhibition and Conference (WEF-TEC), Oct. 2010.
7. Li, F., Sharma, Y., Lei, Y., Zhou, Q., B. Li. “Microbial Fuel Cells: The Effects of Configurations, Electrolyte Solutions, and Electrode Materials”. Applied Biochemistry Biotechnology. DOI 10.1007/s12010-008-8516-5. 2009.
8. Sharma, Y. B. Li. “The variation of power generation with organic substrates in single-chamber microbial fuel cells (SCMFCs)”. Bioresource Technology. 101 (6): 1884-1850. 2009.
9. Sharma, Y., B. Li. “Optimization of hydrogen production from wastewater in batch reactors through experimental and kinetic analysis”. International Journal of Hydrogen Energy. 34 (15): 6171-6180. 2010.
10. Sharma, Y., B. Li. “Optimizing energy harvest in wastewater treatment by combining anaerobic hydrogen producing biofermentor (HPB) and microbial fuel cell (MFC)”. International Journal of Hydrogen Energy. 35 (8): 3789-3797. 2010.
11. Sharma, Y., Parnas, R., B.Li. “Bioenergy production from glycerol in hydrogen producing bioreactors (HPBs) and microbial fuel cells (MFCs)”. International Journal Hydrogen Energy, 36 (6). 3853-3861. 2011.

Products and outcomes of the Connecticut Water Resource Center Project "Optimization of Acidogenic Anaerobic Wastewater Treatment with The Potential for Water Reclamation"

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Research: The research project focused on the optimization of acidogenic anaerobic wastewater treatment, wastewater effluent quality and the bioenergy production from wastewater treatment. Anaerobic treatment has been extensively tested in batch-mode (100 mL) and continuous-mode (2L). The effects of contaminant concentration, pH, and temperature on wastewater treatment and hydrogen production have been elucidated. The correlation between biogas production and liquid fermentation products has been determined. The microbial communities under different operational conditions have been analyzed. In addition, acidogenic wastewater treatment process is also connected with microbial fuel cell (MFCs) to further treat the anaerobic effluent for water reclamation.

The research has provided significant value for the professional development of Mr. Yogesh Sharma. He has presented at several conferences and won the Poster Award in WEFTEC 2009. Yogesh also presented the research in the WEFTEC 2010 Annual Conferences. He also submitted five journal papers based on the research project. In 2009, Yogesh won the Outstanding Environmental Engineering Graduate Student Award In NEWEA.

Research conducted in 2010: Due to the success of batch-mode tests and preliminary results of continuous-mode results, the optimization of continuous-mode systems has been conducted in 2010. The effects of contaminant concentration, pH and temperature on wastewater treatment efficiency, hydrogen production and liquid fermentation pathways will be extensively investigated in the continuous-flow systems, which is similar to the real-world treatment processes. Finally, the co-metablism of glycerol and glucose in anaerobic biofermentor was conducted to convert the biodiesel waste to clean energy source.

Presentation delivered from the project.

1. Y. Sharma, and B.Li. Optimization of hydrogen production in anaerobic acidogenic phase and electricity generation in MFCs. *ACS Annual Conference. March 2010.*
2. Y. Sharma, and B.Li. Co-metablism of biodiesel waste to clean energy. W*ater Environmental Federation Technical Exhibition and Conference (WEF-TEC)*, Oct. 2010.

Journal paper submitted from the project.

1. Li, F., Sharma, Y., Lei, Y., Zhou, Q., B. Li. "Microbial Fuel Cells: The Effects of Configurations, Electrolyte Solutions, and Electrode Materials". *Applied Biochemistry Biotechnology*. DOI 10.1007/s12010-008-8516-5. 2009.
2. Sharma, Y. B. Li. "The variation of power generation with organic substrates in single-chamber microbial fuel cells (SCMFCs)". *Bioresource Technology.* 101 (6): 1884-1850. 2009.
3. Sharma, Y., B. Li. **"**Optimization of hydrogen production from wastewater in batch reactors through experimental and kinetic analysis". *International Journal of Hydrogen Energy.* 34 (15): 6171-6180. 2010.
4. Sharma, Y., B. Li. "Optimizing energy harvest in wastewater treatment by combining anaerobic hydrogen producing biofermentor (HPB) and microbial fuel cell (MFC)". *International Journal of Hydrogen Energy.* 35 (8): 3789-3797. 2010.

5. Sharma, Y., Parnas, R., B.Li. “Bioenergy production from glycerol in hydrogen producing bioreactors (HPBs) and microbial fuel cells (MFCs)”. *International Journal Hydrogen Energy*, 36 (6). 3853-3861. 2011.