FREDDY WITARSA

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CURRENT

Assistant Professor, Physical and Environmental Sciences, Colorado Mesa University.
Courses Taught: Introduction of Environmental Science (ENVS 101), Renewable Energy (ENVS 370), Systems Thinking in Environmental Science (ENVS 396).

EDUCATION

Ph.D. in Environmental Science and Technology (Concentration: Ecological Technology Design);

University of Maryland, College Park, Maryland
Graduation Date: August 2015/ GPA: 4.0
Research Dissertation Title: Increasing the Sustainability of Psychrophilic Small-Scale Anaerobic Digesters

B.S. in Biochemistry, Cell and Molecular Biology;

Drake University, Des Moines, Iowa
Graduation Date: May 2007/ GPA: 4.0 (*Summa Cum Laude*)

RESEARCH EXPERIENCE

Postdoctoral Associate, University of Maryland, MD (2016 – Present)

- Determine methane and energy production potential during anaerobic digestion of algae harvested from algal flow way, a technology that captures nutrients from water and produces biomass that can be digested
- Determine the hydrogen sulfide concentration of biogas produced during anaerobic digestion of algae from algal flow way
- Investigate different pre-treatment techniques to increase methane and energy production during the anaerobic digestion of algae

Postdoctoral Associate, University of Maryland, MD (2015 - Present)

- Reduce environmental impacts of poultry litter on Chesapeake Bay watershed
- Create an innovative nutrient capture system combined with anaerobic digestion to produce renewable energy, reduce nutrient runoff, and produce saleable fertilizer
- Investigate the fate of emerging organic pollutants in poultry litter digestion

Graduate Research Assistant, University of Maryland, MD (2010 - 2015)

- Determined the effect of psychrophilic inocula for temperate climate anaerobic digesters
- Conducted qPCR and T-RFLP analyses to determine archaeal and methanogenic communities in anaerobic digestion
- Conducted comparative life cycle assessment (LCA) of digesters in China and the US

Maize Production-Transformation Laboratory Research Assistant, Pioneer-Hi Bred International Inc., IA (2006 - 2007)

- Assisted the maize production team in performing maize transformation procedures
- Performed essential transformation processes, including embryo extraction, embryo infection, and callus sub-culturing
- Prepared samples for PCR-related and agro-persistence testing

Molecular Biology Undergraduate Research Assistant, Drake University, IA (2005 - 2007)

- Collaborated with mentor Dr. Jerry E. Honts in studying the proteomics of *Tetrahymena* cytoskeleton
- Conducted assays to purify cell and protein samples
- Performed experimental procedures such as gel electrophoresis and western blot

ACADEMIC EXPERIENCE

Ecological Design Laboratory Instructor, University of Maryland, MD (2012)

- Instructed 20 senior undergraduate students in learning techniques for monitoring water quality, including measurements of BOD, COD, TS, VS, NO_3^-, and PO_4^{3-}
- Assisted students in the design and construction of anaerobic digesters, a hands-on research project that brought the concepts of ecological design to life
- Redesigned the laboratory curriculum for simultaneous acquisition and application of laboratory techniques for their research project
- Created PowerPoint presentations to instruct students on basic lab procedures, lab safety, hypothesis formation, statistical analyses, and creating improved Excel spreadsheets
- Graded all laboratory reports and final design projects

Environmental Issues and Culture in USA and China Assistant Instructor, University of Maryland, MD, and Northwest Agriculture & Forestry University, China (2012)

- Provided technical support for a class conducted over web conferencing system in two countries, and served as the sole instructor for the US-based classroom
- Advised students on projects related to Chinese and US environmental issues and culture
- Gave lectures on introductory Mandarin and anaerobic digestion in China and the US.

General Chemistry Laboratory Instructor, Drake University, IA (2007 - 2010)

- Led a total of 85 students per semester in conducting chemistry laboratory experiments
- Equipped students with the necessary skills and foundations to conduct successful laboratory experiments with the ability to professionally document experimental data
- Introduced new and exciting experiments for the general chemistry curriculum, including the use of chromatographic techniques to solve a simulated crime scenario

Biology and Chemistry Tutor, Drake University, IA (2008 - 2010)

- Provided students with supplementary lessons to allow them to excel in biology and chemistry classes

Resident Assistant, Drake University, IA (Summer 2005, 2006 - 2007)

- Organized programs directed at enhancing 25 residents' learning experience
- Assisted residents with their personal lives and studies
- Enforced policies and guidelines to ensure a safe living environment

PUBLICATIONS

Hassanein, A., **Witarsa, F.**, Guo, X., Liang, Y., Lansing, S., Qiu, L., 2017. Next generation digestion: complementing anaerobic digestion (AD) with a novel microbial electrolysis cell (MEC) design. *International Journal of Hydrogen Energy* (In Press).

Witarsa, F., Lansing, S., Yarwood, S., Gonzalez Mateu, M., 2016. Incubation of innovative methanogenic communities to seed anaerobic digesters. *Applied Microbiology and Biotechnology* 100, 9795-9806.

Wang, Y., **Witarsa, F.**, 2016. Application of Contois, Tessier, and first-order kinetics for modeling and simulation of a composting decomposition process. *Bioresource Technology* 220, 384-393.

Witarsa, F., Lansing, S., 2015. Quantifying methane production from psychrophilic laboratory-scale anaerobic digestion of separated and unseparated dairy manure. *Ecological Engineering* 78, 95-100.

Hassanein, A.A.M., Qiu, L., Pan, J., Ge, Y., **Witarsa, F.,** Hassanain, A.A., 2015. Simulation and validation of a model for heating underground biogas digesters by solar energy. *Ecological Engineering* 82, 336-344.

Witarsa, F., Lansing, S., Yarwood, S., Zhiteneva, V. Alternative Inoculum Sources for Psychrophilic and Mesophilic Anaerobic Digestion. (In Preparation).

Witarsa, F., Lupitskyy, R., Lansing, S., Moss, A., Kulow, A. Innovative Ammonia-Stripping System to remove and Capture Ammonia from Anaerobically Digested Poultry Litter (In Preparation).

PROFESSIONAL PRESENTATIONS (student advisees are underlined)

Witarsa, F., 2015. Graduate Research Exchange in China. The University of Maryland Graduate School Awards Ceremony, College Park, MD **(Invited).**

Witarsa, F., Lansing, S., 2014. Alternative Inoculum Sources for Psychrophilic and Mesophilic Anaerobic Digestion. Hua Zhong Agricultural University, Wuhan, China. **(Invited).**

Witarsa, F., Lupitskyy, R., Lansing, S., Moss, A., Kulow, A., 2017. Innovative Ammonia-Stripping System to Remove and Capture Ammonia from Anaerobically Digested Poultry Litter. Association of Environmental Engineering & Science Professors Conference, University of Michigan, Ann Arbor, MI.

Witarsa, F., Lansing, S., Kangas, P., May, P., Darby, E., 2017. Creating Bioenergy from Algal Flow Way Using Anaerobic Digestion. American Ecological Engineering Society Meeting, University of Georgia, Athens, GA.

Witarsa, F., Lansing, S., Hassanein, A., Ge, Y., Qiu, L., 2016. Using Life Cycle Assessment (LCA) to Quantify the Sustainability of US Plug-Flow and Chinese Fixed-Dome Anaerobic Digesters. American Society of Agricultural and Biological Engineers Conference, Orlando, FL.

Witarsa, F., Lansing, S., Moss, A., Kulow, A. 2016. Poultry Litter Treatment Using Anaerobic Digestion Combined with Chemical/Biochemical Nutrient Removal Technique. American Ecological Engineering Society Meeting, Knoxville, TN.

Mangrum, D., Lansing S., **Witarsa, F.** 2016. Effect of separation on poultry manure digestion. American Ecological Engineering Society Meeting, Knoxville, TN.

Witarsa, F., Hassanein, A., Qiu, L., Lansing, S., 2015. Using Digestion Combined with Microbial Electrolysis Cell to Increase Energy Production. American Ecological Engineering Society Meeting, Stillwater, OK.

Witarsa, F., Lansing, S., Hassanein, A., Ge, Y., Qiu, L., 2015. Comparative Life Cycle Assessment (LCA) of Unheated Chinese Fixed-Dome Digester with Heated and Insulated Plug-Flow Digester in the US. American Ecological Engineering Society Meeting, Stillwater, OK.

Witarsa, F., Lansing, S., Yarwood, S., Zhiteneva, V., 2014. Alternative Inoculum Sources for Psychrophilic and Mesophilic Anaerobic Digestion. China Biogas Meeting. Shaanxi, China.

Witarsa, F., Lansing, S., Yarwood, S., Mateu, M., Zhiteneva, V., 2014. Incubation of Innovative Methanogenic Communities to Seed Anaerobic Digesters. American Ecological Engineering Society Meeting, Charleston, SC.

Witarsa, F., Lansing, S., Zhiteneva, V., Bowen, H., Kenny, C., 2013. Alternative Sources of Inoculum to Increase Methane Production in Psychrophilic Anaerobic Digesters Treating Dairy Manure. American Ecological Engineering Society Meeting, East Lansing, MI.

Witarsa, F., Lansing, S., 2013. Digesters Worldwide and Research to Overcome Limitations in a Temperate Climate. Small-Scale Anaerobic Digester for Dairy - Field Workshop, USDA Beltsville Agricultural Research Center, Beltsville, MD.

Witarsa, F., Lansing, S., 2012. Quantifying Methane Production from Lab-Scale Anaerobic Digestion of Dairy Manure at Low Temperatures. American Ecological Engineering Society Meeting, Syracuse, NY.

Zbornik, E., **Witarsa, F.**, Seidel, J., Gullicksrud, J., Caswell, E., Said, H., Honts, J.E., Anderson, P.C., Wetland, A.L., Beussman, D.J., Fulton, R.B., Murakami, M., Cole, E.S., 2007. Proteomic Analysis of the Membrane Skeleton of Tetrahymena Thermophila. Drake University Conference on Undergraduate Research in the Sciences, Des Moines, IA, and Annual Midwest Protozoology Conference, St. Louis, MO.

GRANTS AND AWARDS

Developing Inoculum to Increase Anaerobic Digestion Efficiency in Winter Months

Sponsor: Northeast Sustainable Agriculture Research and Education (NESARE)
Amount: $14,974 (2011-2013)
Writer: **Freddy Witarsa;** PI: Dr. Stephanie Lansing

International Graduate Research Exchange Fellowship

Sponsor: University of Maryland Graduate School, College of Agriculture and natural Resources, Environmental Science & Technology Department, and Northwest Agriculture & Forestry University, China.
Amount: $6,000 (2014)

Dean's Fellowship
Sponsor: University of Maryland Graduate School
Amount: $5,000 (2012-2013)

American Ecological Engineering Society Student Travel Awards
Sponsor: American Ecological Engineering Society
Amount: $250 per year (2012-2015)

Presidential and Merit Scholarships
Sponsor: Drake University
Amount: $13,000 annually (2004-2007)

LABORATORY SKILLS/TECHNIQUES

- **Water Quality:** COD, BOD, TS, VS, NH_4^+-N, NO_3^--N, NO_2^--N, and PO_4^{3-} analyses
- **Microbiology and Molecular Biology:** sterile technique, cell culturing, cell staining, plant embryo infection, protein and DNA extraction, PCR, qPCR, T-RFLP, western blot, and SDS-PAGE/agarose gel electrophoresis
- **Instrumentation:** spectrophotometer and GC (FID, TCD)

RELATED SKILLS

- Proficient with SimaPro, a life cycle assessment (LCA) software, and SAS
- Fluent in English; Familiar with Bahasa Indonesia and Mandarin

AWARDS

- Outstanding Graduate Assistant Award (top 80 out of 4,000), University of Maryland (2015)
- Biochemistry, Cell, and Molecular Biology Research Award, Drake University (2005)
- American Chemical Society Analytical Chemistry Award, Drake University (2005)
- President's List for six consecutive semesters, Drake University (2004 - 2007)

EXTENSION ACTIVITIES TO PROMOTE GROWTH IN A DEVELOPING COUNTRY

- Vice-Head for one of two committees that collected and counted ballots for the Republic of Indonesia Presidential Election, Washington DC district (2014)
- Assisted with the organization of Indonesian International Scholars Association (I-4) workshop at the University of Maryland (2012)

Professional Presentation:

- **Witarsa, F.**, Putra, A. 2013. Integrating Ecological Technology into Indonesia's Wastewater Treatment Infrastructure. US Indonesian Students Association (Permias) Congress, Washington D.C.

Media Appearances:

- Voice of America (VOA) Indonesia. 2013. *Freddy Witarsa, Indonesian Research Scientist in the United States* (In Indonesian). Aired on Indonesian television program, *Dahsyat*, RCTI. http://www.youtube.com/watch?v=9gFmkeppdZI (Accessed 1/16/2014).
- Voice of America (VOA) Indonesia. 2013. *Indonesian Scientist in the United States* (In Indonesian). Aired on Indonesian television program, *Friends*, ANTV. http://www.youtube.com/watch?v=9gFmkeppdZI (Accessed 1/16/2014).

- Voice of America (VOA) Indonesia. 2013. *Career as a Research Scientist-VOA Career Day* (In Indonesian). http://www.youtube.com/watch?v=HuAd8FtemOw (Accessed 1/16/14).

MEMBERSHIPS

- Member of American Ecological Engineering Society (AEES) (2011 - Present)
- Member of American Society for Agricultural & Biological Engineers (ASABE) (2016 - Present)
- Advisor for Association of Indonesian Students, University of Maryland, MD (2016 - Present)
- International Students' Association Executive Council, Drake University, IA (2005 - 2006)