DEPARTMENT OF ENVIRONMENTAL SCIENCE & TECHNOLOGY

Waste to Energy Lab

Waste to Energy University of Maryland

Vision

The Waste to Energy Lab, led by Dr. Stephanie Lansing, quantifies turning waste to renewable energy, investigates nutrient transformations during treatment, energy production, removal of antimicrobial resistance (AMR) through treatment, and improving water quality.

Current Projects

- Quantifying cattle manure-AMR perceptions and treatment system variabilities to develop a novel communication framework for conveying AMR science and mitigation opportunities
- Biogas enhancement and ammonia extraction for increased revenue in waste-to-energy systems.
- Use of Nanoparticles to Enhance Performance and Viability of Anaerobic Digesters
- UMD Global STEWARDS (STEM Training at the Nexus of the Energy Water Reuse and Food systems).

DEPARTMENT OF ENVIRONMENTAL SCIENCE & TECHNOLOGY
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Undergraduate Program	Graduate Program
Ecological Technology Design	Soil and Watershed Sciences
Ecosystem Health	Ecological Technology Design
Soil and Watershed Science	Wetland Science
Natural Resources Management	Ecosystem Health & Natural Resource Management

Waste to Energy

Associate Professor Stephanie Lansing's research focuses on:

- Bioenergy and waste treatment using ecological engineering
- Waste to Energy Research: Anaerobic digestion, microbial fuel cells, gasification, microbial electrolysis cells, and solid-oxide fuel cells
- Life cycle assessments (LCA) and Energy (eMergy) of bioenergy
- Antimicrobial resistance, persistence and treatment in dairy and beef manure waste management processes
- Recovering nutrients from waste using post-nutrient extraction after anaerobic digestion
- Nutrient recovery from Chesapeake Bay using algal turf scrubber (ATS) with anaerobic digestion of algae feedstocks to drive a fuel cell at the Port of Baltimore
- Food waste, dairy and poultry manure digestion in Maryland, as well as sanitary waste digestion in Haiti
- Small-scale digesters for the US and developing countries
- High temperature and high pressure anaerobic digestion
- Effects of nanoparticles on anaerobic digestion and post-digestion utilization

What Is Anaerobic Digestion?

When organic waste substrates enter an enclosed digestion container without oxygen, microorganisms can use the waste as a carbon/nutrient source to produce methane-enriched biogas. This biogas can be used directly for heating or cooking, can be used to power an electric generator, or upgraded to renewable natural gas. During the digestion process, solids, odor, and pathogens are drastically reduced while nutrients are retained, resulting in a high-value liquid fertilizer.

What Are Anaerobic Digestion Substrates?

Dr. Lansing researches various substrates to increase the value and efficiency of digestion technology. Algae can be used for cleaning polluted water, with the carbon-rich substrate digested for biogas production. Food waste has a high biogas potential, with more than 34 million tons of food waste entering landfills each year, diverting food waste to digesters could increase biogas production and economic viability of agricultural digesters. In addition, to manure used in agricultural digesters in Maryland, Dr. Lansing has designed and constructed sanitary wastewater digesters using latrine wastes in Haiti, which reduces pollution and pathogens from untreated waste and deforestation, by providing biogas for cooking, replacing charcoal and firewood, which are the main energy sources in Haiti.

Anaerobic Digester Benefits Include:

- Renewable energy production in the form of biogas
- Wastewater treatment, with large decreases in organic pollutants
- Creation of a fertilizer that is high in dissolved nutrients
- Large reductions in noxious odors
- Capture and utilization of methane, a greenhouse gas 25 times more powerful than CO2

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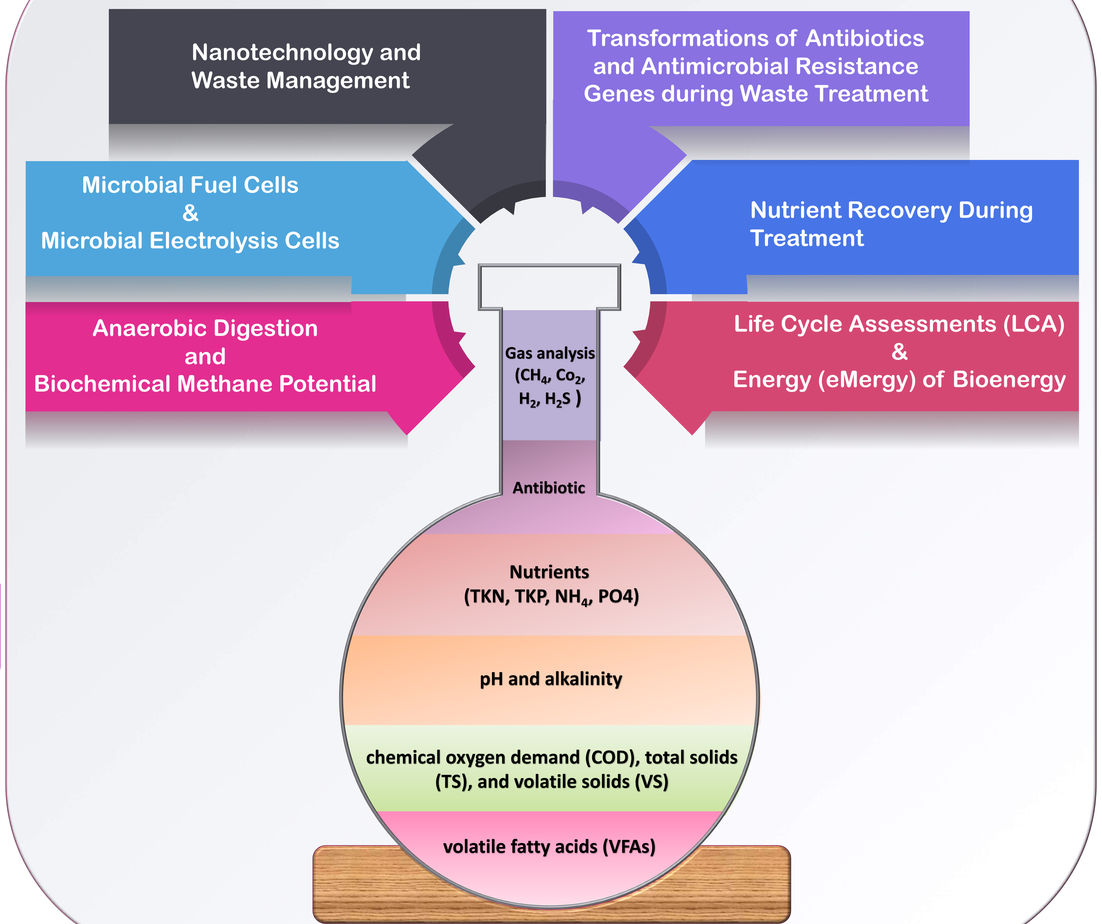
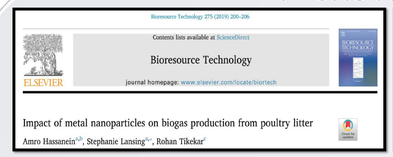
Waste to Energy Lab Research

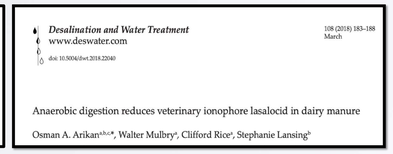


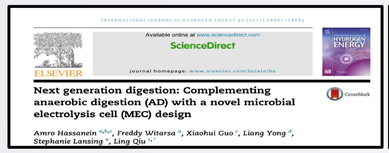
Publication


Bioresource Technology 275 (2019) 200–206
Contents lists available at ScienceDirect
Bioresource Technology
journal homepage: www.elsevier.com/locate/biortech
Impact of metal nanoparticles on biogas production from poultry litter
Amro Hassanein[a,b], Stephanie Lansing[a,c,*], Rohan Tikekar[a]

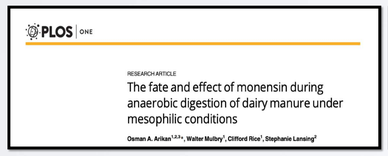

Environmental Science & Technology
Article
pubs.acs.org/est
Trends in Antimicrobial Resistance Genes in Manure Blend Pits and Long-Term Storage Across Dairy Farms with Comparisons to Antimicrobial Usage and Residual Concentrations
Jerod J. Hurst,[†] Jason P. Oliver,[‡] Jenna Schueler,[§] Curt Gooch,[‖] Stephanie Lansing,[§] Emily Crossette,[‖] Krista Wigginton,[†] Lutgarde Raskin,[†] Diana S. Aga,[⊥] and Lauren M. Sassoubre[*,†]

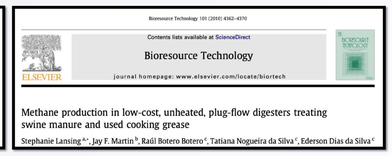

Bioresource Technology 245 (2017) 803–809
Contents lists available at ScienceDirect
Bioresource Technology
journal homepage: www.elsevier.com/locate/biortech
Waste treatment and energy production from small-scale wastewater digesters
Stephanie Lansing[a,*], Ayella Maile-Moskowitz[a], Alexander Eaton[b]


Desalination and Water Treatment
www.deswater.com
doi: 10.5004/dwt.2018.22040
108 (2018) 183–188
March
Anaerobic digestion reduces veterinary ionophore lasalocid in dairy manure
Osman A. Arikan[a,b,c,*], Walter Mulbry[a], Clifford Rice[a], Stephanie Lansing[b]


INTERNATIONAL JOURNAL OF HYDROGEN ENERGY 41 (2016) 18484–18494
Available online at www.sciencedirect.com
ScienceDirect
journal homepage: www.elsevier.com/locate/he
Next generation digestion: Complementing anaerobic digestion (AD) with a novel microbial electrolysis cell (MEC) design
Amro Hassanein[a,b,c], Freddy Witarsa[a], Xiaohui Guo[c], Liang Yong[d], Stephanie Lansing[a,*], Ling Qiu[c,*]


Appl Microbiol Biotechnol (2016) 100:9795–9806
DOI 10.1007/s00253-016-7875-z
BIOENERGY AND BIOFUELS
Incubation of innovative methanogenic communities to seed anaerobic digesters
Freddy Witarsa[1] · Stephanie Lansing[1] · Stephanie Yarwood[1] · Martina Gonzalez Mateu[1]


PLOS ONE
RESEARCH ARTICLE
The fate and effect of monensin during anaerobic digestion of dairy manure under mesophilic conditions
Osman A. Arikan[1,2,3]*, Walter Mulbry[2], Clifford Rice[1], Stephanie Lansing[3]


Bioresource Technology 101 (2010) 4362–4370
Contents lists available at ScienceDirect
Bioresource Technology
journal homepage: www.elsevier.com/locate/biortech
Methane production in low-cost, unheated, plug-flow digesters treating swine manure and used cooking grease
Stephanie Lansing[a,*], Jay F. Martin[b], Raúl Botero Botero[c], Tatiana Nogueira da Silva[c], Ederson Dias da Silva[c]

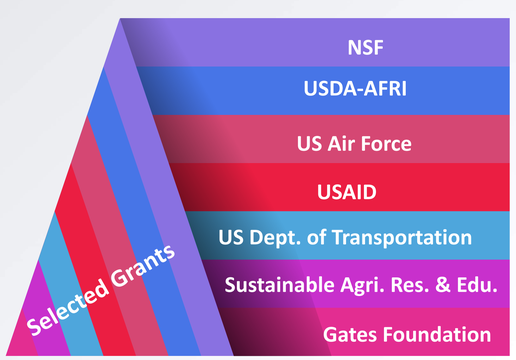

Biomass and Bioenergy 91 (2016) 288–295
Contents lists available at ScienceDirect
Biomass and Bioenergy
journal homepage: http://www.elsevier.com/locate/biombioe
Research paper
Methane production for sanitation improvement in Haiti
Stephanie Lansing[a,*], Holly Bowen[a], Kyla Gregoire[b,1], Katherine Klavon[a], Andrew Moss[a], Alexander Eaton[c], Yen-Jung Lai[a,2], Kayoko Iwata[a]


Bioresource Technology 178 (2015) 230–237
Contents lists available at ScienceDirect
Bioresource Technology
journal homepage: www.elsevier.com/locate/biortech
Anaerobic co-digestion of forage radish and dairy manure in complete mix digesters
Ashley J. Belle[a], Stephanie Lansing[a,*], Walter Mulbry[b], Ray R. Weil[a]


Waste Management 87 (2019) 63–70
Contents lists available at ScienceDirect
Waste Management
journal homepage: www.elsevier.com/locate/wasman
Effect of anaerobic digester inoculum preservation via lyophilization on methane recovery
Andrea Yarberry[a], Stephanie Lansing[a,*], Heather Luckarift[b,c], Robert Diltz[c], Walter Mulbry[d], Stephanie Yarwood[d]

Full list of publications

Grants



PRIZES & AWARDS

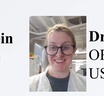
- Faculty Mentor of the Year. Institute on Teaching and Mentoring, The Compact for Faculty Diversity (national award)(Lansing).
- Young Engineer of the Year. Northeast Agricultural and Biological Engineers Conference (NABEC) given to one member each year for outstanding accomplishments in research, design, extension (US and Canada Northeast region)(Lansing).
- NSF Global Stewards Fellow (Poindexter)
- **Media Coverage**

- Tolley, J., 2018. Maryland is turning algae into electricity AND cleaning up the Chesapeake Bay: BTN LiveBIG.
- Baragona, S., 2018. Algae harnessed to make clean water, clean power. Algae World News. December 6, 2018. Available at: http://news.algaeworld.org/2018/12/algae-harnessed-to-make-clean-water-clean-power/

Lab Group


Dr. Stephanie Lansing
Associate Professor
Principal investigator
ENST


Dr. Amro Hassanein
Post-Doc Associate
ENST


Dr. Annie Yarberry
ORISE Fellow
USDA-ARS


Abhinav Choudhury
Ph.D. Candidate
ENST


Carlton Poindexter
PhD. Student
ENST


Danielle Delp
PhD. Student
ENST


Joan Briggs
Undergraduate Student
ENST


Emily Keller
Undergraduate Student


Chibueze Achi
Fulbright Scholar
ENST


Theophilus Nimpson
Undergraduate Student
ENST


Derrick Sanders
High School Student
Eleanor Roosevelt
High School

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