

Caitlyn S. Butler

(maiden name: Shea)

University of Massachusetts, Department of Civil and Environmental Engineering
16B Marston Hall, 130 Natural Resources Road
Amherst, MA 01003 413-545-5396

Education

Ph.D., Environmental Engineering, Department of Civil Engineering and Geological Sciences, University of Notre Dame, 2010

Dissertation: *Fundamental and Applied Studies of Microbial Fuel Cells for Sustainable Water and Wastewater Treatment*, Adviser: R. Nerenberg, Ph.D.

B.S., Engineering Science, Picker Engineering Program, Smith College, 2004

Honors Thesis: *Mechanistic Study of the Oxidation of H-terminated Silicon(100)*, Adviser: K.T. Queeney, Ph.D.

Current and Previous Positions

Assistant Professor, Department of Civil and Environmental Engineering, University of Massachusetts, Amherst, MA 2011-present

Research Interests: *My research objectives focus on developing energy-efficient treatment strategies for both water and wastewater treatment. I examine focus on biofilm systems where microorganisms use counter-diffusional chemical gradients to accomplish treatment goals. I am interested in developing scalable process designs that could be easily integrated into existing treatment infrastructure, but is also interested in the ecology and function of the microorganisms that facilitate treatment. In addition to my technical research objectives, I am also interested in developing and assessing the effectiveness of novel educational techniques and strategies to improve engineering education.*

Assistant Professor, Department of Engineering, College of Technology and Innovation, Arizona State University, Mesa, AZ, 2010-2011

Graduate Faculty, Civil, Environmental, and Sustainable Engineering Ph.D. Program, School of Sustainability and the Built Environment, College of Engineering, Arizona State University, Tempe, AZ, 2010-2011

Graduate Research Assistant, Department of Civil Engineering and Geological Sciences, University of Notre Dame, Notre Dame, IN, 2004-2009

Research Topics: *Microbial Fuel Cells (MFCs), Microbial Ecology, Scalable MFC Reactor Design Using Hollow Fiber Membranes and Biocathodes for Denitrification and Perchlorate Reduction*, Adviser: R. Nerenberg, Ph.D.

Graduate Teaching Assistant, Department of Civil Engineering and Geological Sciences

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Curriculum Vitae - 1 of 18

and Department of Chemical Engineering, University of Notre Dame, Notre Dame, IN, 2004-2007

Courses: *Introduction to Chemical Engineering, Introduction to Environmental Engineering, Hazardous Waste Management, Civil Engineering Materials, and Environmental Microbiology*

Undergraduate Research Assistant, Department of Chemistry, Smith College, Northampton, MA, 2002-2004

Research Topic: *Mechanistic Study of the Oxidation of H-terminated Silicon and Protein Adsorption to Silicon Surfaces*, Adviser: K. Queeny, Ph.D.

Undergraduate Teaching Assistant Department of Physics and Picker Engineering Program, Smith College, Northampton, MA, 2002-2004

Courses: *Fundamentals of Environmental Engineering, Mass and Energy Balances and Introduction to Physics*

Undergraduate Research Assistant, Picker Engineering Program, Smith College, Northampton, MA, 2001-2002

Research Topic: *Impedance of the Human Ear Canal*, Adviser: S. Voss, Ph.D.

Vice-President of Distribution - "Hears to You": The National Discount Battery Service, Northampton, MA 1996-2004

Fellowships, Honors and Awards

Student Centered Teaching and Learning Fellowship, awarded by University of Massachusetts Center for Teaching and Faculty Development, 2015

National Science Foundation CAREER Award, for five years of research support for the improved understanding of cross-kingdom biofilms, 2015

African Research and Technological Innovation Award, awarded by the African Ministers' Council on Water for the development and deployment of the Microbial Fuel Cell Latrine, 2015

Exceptional Merit Award, award in recognition of professional accomplishments by the Office of the Provost, University of Massachusetts, Amherst, 2014

ASCE ExCEED Fellowship, a fellowship awarded to attend the ASCE Excellence in Civil Engineering Education (ExCEED) Teaching Workshop, 2012

NSF Environmental Molecular Science Institute Fellowship, a research fellowship awarded internally by EMSI at the University of Notre Dame, 2009

Bayer Predoctoral Research Fellowship, a research fellowship given by the Center for Environmental Science and Technology at the University of Notre Dame, 2008

Excellence in Teaching Award, given by the Kaneb Center for Teaching and Learning at University of Notre Dame, 2007

Transatlantic Environmental Biotechnology Fellowship, for travel to and work at the Laboratory for Microbial Ecology and Technology at Ghent University, Ghent, Belgium. Supported by EU-US Task Force on Biotechnology, 2007

Adeline Devor Penberthy Memorial Prize, for excellence in engineering and leadership at Smith College, 2004

Picker Engineering Fellowship, a four year undergraduate scholarship at Smith College, 2000-2004

Teaching Experience

Department of Civil and Environmental Engineering, University of Massachusetts, Amherst, MA, 2011-present

Courses Instructed:

1. Bioprocess Lab - CEE 697P - Fall 2016
2. Environmental Engineering Microbiology - CEE 573 - Fall 2015
3. Biological Processes in Environmental Engineering - CEE 671 - Fall 2011, 2012, 2013
4. Introduction to Environmental and Water Resources Engineering - CEE 370 - Spring 2012, 2014, 2016, Fall 2014

Department of Engineering, College of Technology and Innovation, Arizona State University, Mesa, AZ, 2010-2011

Courses Instructed:

1. Engineering Design - EGR 202 - Spring 2010, Spring 2011
2. Civil Engineering Capstone - EGR 401/402
2009-2010 - Civil Infrastructure Solutions in Ghana, Africa
2010-2011 - Quagga Mussel Prevention at Desert Basin Power Generation Facility
3. Environmental Engineering - EGR 494 - Fall 2010
4. Material Selection - EGR 224 - Spring 2011

Notable Professional Development and Achievements

Innovate@UMass, awarded a fellowship to participate in the inaugural symposium to provide faculty with hands-on training in latest instructional technologies while building a community of scholars who will contribute to a campus innovation think tank throughout the academic year. Amherst, MA, 2016

NEWEA Community Award, worked with Kathleen Shea of the Clarke Schools for Hearing and Speech to develop elementary engineering curriculum based in language develop and acquisition. This work was award a \$1000 grant from the New England Water Environment Association for the purchase of classroom science and engineering materials. 2015-2016

Nominated for Distinguished Teaching Award, University of Massachusetts, 2016

Research Advising

Civil and Environmental Engineering, University of Massachusetts, Amherst, MA, 2011-present

Postdoctoral Scholars

Cloelle S.G. Danforth (nee Giddings), Research Topic: *Reactor Design for Microbial Electro-synthesis*, Research Period: May 2012 - June 2013

PhD Students

Joann Rodriguez Suarez, co-advised with Dr. Boris Lau, Research Topic: *Nanoparticles in Biofilms*, Student Accomplishments: *Ford Foundation Fellowship Honorable Mention, 2016*, Start: August 2015, Expected completion: August 2018

Varun Srinivasan, Research Topic: *Microbial Competition in Electrode-Associated Biofilms*, Student Accomplishments: *Edward Sisson Fellowship, Awarded: 2013, Biofilm Summer School Fellowship, Awarded: 2014, Berger Award, Awarded: 2015*, Start: August 2012, Expected completion: December 2016

Cynthia Castro, Research Topic: *Microbial Dynamics in Large-scale Anodes*, Student Accomplishments: *National Science Foundation (NSF) Graduate Research Fellowship, Awarded: 2012, Texas AWWA Scholarship Awarded: 2012, NSF Graduate Research Opportunities Worldwide, Awarded: 2014, Perrell Fellowship, Awarded: 2017*, Start: January 2014, Expected completion: May 2017

Masters Students

Megan Hann, Research Topic: *Mechanisms of formation and ecology of Oxygenic Photogranules*, Start: August 2016, Expected Completion: May 2018

Kristie Stauch-White, Research Topic: *Microbial Ecology in Oxygenic Photogranules*, Student Accomplishments: *Boscov Fellowship, Awarded: 2014, National Science Foundation (NSF) Graduate Research Fellowship, Awarded: 2015, Noga Award, Awarded: 2016*, Start: August 2013, Completed: December 2016

Joshua Jack, Research Topic: *Novel Reactor Design for a MFC to Retrofit Composting Latrines*, Start: August 2014, Completed: December 2015

Cynthia Castro, Research Topic: *Developing a Microbial Fuel Cell Pit Latrine for Organics and Nitrogen Removal*, Start: August 2011, Completed: January 2014

Jacob Weinrich, Research Topic: *Bioelectrochemical Reduction of Oxidized Contaminants*, Start: August 2011, Completed: September 2013

Thesis and Dissertation Committee Member

Civil and Environmental Engineering, University of Massachusetts, Amherst,

MA, 2012-present

Christopher Watt, Thesis: *Using Oxygenic Biogranules in Sequencing Batch Reactors to Treat Wastewater*, Committee Chair: Chul Park

Heonsop Eom, Dissertation: *Investigation of Bioavailability of Dissolved Organic Nitrogen (DON) Derived from Conventional Activated Sludge (CAS) and Biological Nutrient Removal (BNR) Processes*, Committee Chair: Chul Park

Aaron Brennan, Thesis: *Investigating Pilot Scale Performance of an Activated Sludge Wastewater Treatment system with a High Rate Anaerobic Side Stream Reactor*, Committee Chair: Chul Park

Department of Microbiology, University of Massachusetts, Amherst, MA, 2011-2014

Sarah Hensley, Dissertation: *Optimizing Bioremediation of Complex Organic Compounds using Hyperthermophiles Through the Determination of Factors Effecting Archaeal Fermentation Balance*, Committee Chair: Jim Holden

Department of Landscape Architecture and Regional Planning, University of Massachusetts, Amherst, MA, 2012-2014

Katie Fox, Thesis: *A Grounded Theory Analysis of the Green Latrine Sanitation Pilot Project Planning and Construction at the Nyakrom Secondary Technical School in Nyakrom, Ghana*, Committee Chair: Ellen J. Pader

Center for Environmental Biotechnology, Biodesign Institute, Arizona State University, Tempe, AZ, 2010

Precious Biyela, Dissertation: *Water Quality Decay and Pathogen Survival in Drinking Water Distribution Systems*, Committee Chair: Bruce Rittmann

Additional Graduate Student Mentoring

University of Massachusetts Innovation Challenge

Team Green Latrine:

Cynthia Castro and Joe Goodwill, Civil and Environmental Engineering Department, Katie Fox and Sally Miller, Landscape Architecture and Regional Planning Department

Won MinutePitch Competition, Awarded: \$1000, October 2012

Runner-up Executive Summary Competition, Awarded: \$1000, December 2012

Undergraduate Students

Civil and Environmental Engineering, University of Massachusetts, Amherst, MA, 2012-present

Christa Spedding and Leighann D'Andrea, Research Topic: *Urine Composting at the Florence Community Garden, 2016-present*

Katelyn Evans, Research Topic: *Large-scale Microbial Fuel Cell Performance, 2016-present*

Davis Miller, Research Topic: *Nanoparticles and Biofilms, 2016-present*

Dan Clasby, Research Topic: *SCFA Profiles in Fermented Biosolids, 2015-present*

Gilson Hogan, Research Topic: *Cultivation of OPGs, 2015-2016*

Carly Prystac, Research Topic: *Biochar Microbial Fuel Cells, 2013-2014*

Timothy Ma, Research Topic: *MFC Pilot Latrine, 2012-2013*

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Department of Engineering, College of Technology and Innovation, Arizona State University, Mesa, AZ, 2010-2011

David Dulebon and Paul Reidhead, Research Topic: *Organics and Nitrogen Removal from Agricultural Waste Streams via Microbial Fuel Cells*

Peer-Reviewed Journal Articles

** indicates graduate and postdoc advisees*

A note on author order: The convention predominantly observed in my area of research for peer-reviewed original research article is the lead student is the first author and the PI and corresponding author is the last author, anchoring the author list. Contributing students, faculty are researchers are listed based on their contributions in between.

1. Castro, C.*, Srinivasan, V.*, Jack, J.*, and **Butler, C.S.**, Decentralized wastewater treatment using a bioelectrochemical system to produce methane and electricity, *IWA Water Sanitation and Hygiene*, Vol. 6, No 4, 613-621, 2016
2. **Butler, C.S.** and Lovley, D., How to Sustainably Feed a Microbe: Strategies for Biological Production of Carbon-Based Commodities with Renewable Electricity, *Frontiers in Microbiology*, Vol. 7, No. 1879, 2016
3. Lau, B. and **Butler, C.S.**, Censored at the Nanoscale, *Frontiers in Microbiology*, Vol. 7, No. 253, 2016
4. Srinivasan, V.*, Weinrich, J.*, **Butler, C.S.**, Nitrite-Accumulation in a Denitrifying Biocathode, *Environmental Science: Water Research and Technology* Vol. 2, 344 - 352, 2016, (*1 citation*)
5. Giddings, C. S. G.*, Nevin, K. P., Woodward, T., Lovley, D.R., **Butler, C.S.**, Simplifying Microbial Electrosynthesis Reactor Design, *Frontiers in Microbiology*, Vol. 6, No. 468, 2015, (*17 citations*)
6. Castro, C.J.*, Goodwill, J.E.*, Rogers, B., Henderson, M., **Butler, C.S.**, Deployment of the Microbial Fuel Cell Latrine in Ghana for Decentralized Sanitation, *IWA Water Sanitation and Hygiene*, Vol. 4, No. 4, 2014 (*7 citations*)
7. Gedalanga, P., Kotay, S.M, Sales, C.S., **Butler, C.S.**, Goel, R., Mahendra, S., Novel Applications of Molecular Biological and Microscopic Tools in Environmental Engineering, *Water Environment Research*, Vol. 85, No. 10, 2013
8. Mahendra, S., Gedalanga, P., Kotay, S. M., Torres, C. I., **Butler, C.S.**, and Goel, R., Advancements in Molecular Techniques and Applications in Environmental Engineering: A Review, *Water Environment Research*, Vol. 84 No. 10, 2012 (*2 citations*)
9. Goel, R., Kotay, S.M., **Butler, C.S.**, Torres, C.I., and Mahendra, S., Molecular Biological Methods in Environmental Engineering, *Water Environment Research*, Vol. 83, No. 10, 2011 (*3 citations*)
10. **Butler, C.**, Clauwaert, P., Green, S., Verstraete, W., Nerenberg, R., Bioelectrochemical Perchlorate Reduction in a Microbial Fuel Cell, *Environmental Science and Technology*, Vol. 44, No. 12, 2010 (*87 citations*)

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11. **Butler, C.** and Nerenberg, R., Microbial Fuel Cell Performance and Microbial Ecology as a function of Air-Cathode Materials, Applied Microbiology and Biotechnology, Vol. 86, No. 5, 2010 (*28 citations*)
12. Clauwaert, P., Desloover, J., **Shea, C.**, Nerenberg, R., Boon, N., Verstraete, W. Enhanced Nitrogen Removal in Bio-Electrochemical Systems by pH control, Biotechnology Letters Vol. 31, No 6, 2009 (*52 citations*)
13. Kulkarni, M., Green, S. K., **Shea, C.**, and Queeney, K. T., The Role of Etching in Aqueous Oxidation of Hydrogen-Terminated Si(100), Journal of Physical Chemistry C, Vol. 113, No. 23, 2009 (*5 citations*)
14. **Shea, C.**, Clauwaert, P., Verstraete, W., Nerenberg, R., Adapting a Denitrifying Biocathode for Perchlorate Reduction, Water, Science and Technology., Vol 58, No 10, 2008 (*24 citations*)
15. Seders, L., **Shea, C.**, Lemmon, M., Maurice, P., Talley J., LakeNet: An Integrated Sensor Network for Environmental Sensing in Lakes. Environmental Engineering and Science, Vol. 24, No. 2, 2007 (*41 citations*)
16. Voss S., Horton N., Woodbury R., **Shea, C.**, Smith A., Sources of variability in Reflectance Measurements on Normal Human Ears. Huber A. and Eiber A., editor. Proceedings of the 4TH International Symposium on Middle Ear Mechanics in Research and Otology; 2006 27-30, Zurich, Switzerland. World Scientific; 2007. p. 78-86. (*1 citation*)

Book Chapters and Commentaries

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1. Ergas, S. J., Kinyua, M.N., van der Steen, P., **Butler, C.S.**, Lens, P. N. L., Chandran, K. and Mihelcic, J. R., Spotlight: Special Issue of Environmental Engineering Science: Innovative Global Solutions for Bioenergy Production, Environmental Engineering Science, Vol. 33, No. 11, 2016
 2. **Butler, C.S.** and Boltz, J.P., Biofilm Processes and Control in Water and Wastewater Treatment, Comprehensive Water Quality and Purification, Elsevier Major Reference Work, 2013 (*5 citations*)

Manuscripts in Review

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1. Park, C., Kuo-Dahab, C.*, Milferstedt, K., Hamelin, J., **Butler, C.S.**, Stauch-White, K.*, Watt, C., Gonzalez, B., Dolan, S. , Filamentous cyanobacteria drive the development of unusual oxygenic photogranules, Nature Communications, Submitted January 2017
 2. Srinivasan, V. and **Butler, C.S.**, Ecological and Transcriptional Responses of Anode-Respiring Communities to Nitrate in a Microbial Fuel Cell, Environmental, Science and Technology, Submitted: December 2016

Conference Papers

* indicates graduate advisees

** indicates undergraduate advisees

1. Abouhend, A., **Butler, C.S.**, El-Moselhy, K. and Park. C, The Oxygenic Photogranule (OPG) for Aeration-free and Energy-Recovery Wastewater Treatment Process, Water Environment Federation Technical Exhibition and Conference, New Orleans, LA - October 2016 ,
2. Weinrich, J.* and **Butler, C.S.**, Determining Kinetic Parameters Of A Nitrite-accumulating, Denitrifying, Cathode-oxidizing Biofilm, Water Environment Federation Technical Exhibition and Conference, New Orleans, LA - October 2014
3. Bekki, J. M., Dalrymple, O., and **Butler, C.S.**, A Mastery-Based Learning Approach for Undergraduate Engineering Programs, Frontiers in Education, Seattle, WA, October 2012 (*1 citation*)
4. textbfButler, C. and Nerenberg, R., Effects of Oxygen Crossover on Layered, Microbial Fuel Cell Assemblies. International Water Association/Water Environment Federation Biofilm Reactor Technology Conference, Portland, Oregon, August 2010
5. **Butler C.**, Clauwaert, P., Verstraete, W., and Nerenberg, R, Bioelectrochemical Perchlorate Reduction in a Microbial Fuel Cell: Optimizing Cathode pH and Cathode Potential. IWA/WEF Biofilm Reactor Technology Conference, Portland, Oregon, August 2010
6. Brown, D.**, Burns, B.**, Cradic, Z.**, Petrakovitz, D.**, Reeg, M.**, Santos, N.**, and **Butler, C.**, Optimization of Drinking Water Solutions for Rural Villages in Ghana, Africa, Capstone Design Conference, Boulder, CO, June 2010
7. **Butler, C.** and Nerenberg, R., Effects of Oxygen Crossover on Microbial Fuel Cell Performance and Microbial Community Structure. International Water Association Leading Edge Technology, - Phoenix, AZ, June 2010
8. **Butler C.**, Clauwaert, P., Verstraete, W., and Nerenberg, R, Optimizing Cathode pH and Cathode Potential for Bioelectrochemical Perchlorate Reduction. International Water Association Leading Edge Technology, - Phoenix, AZ, June 2010
9. **Shea, C.** and Nerenberg, R., BOD and Total Nitrogen Removal from Wastewater Using Microbial Fuel Cells. Water Environment Federation Nutrient Removal Conference, Washington D.C. - June 2009
10. **Shea, C.** and Nerenberg, R., A High-Performance, Air-Cathode Microbial Fuel Cell with Potential for Retrofitting into Activated Sludge Plants. Water Environment Federation Technical Exhibition and Conference, Chicago, IL - October 2008
11. **Shea, C.** and Nerenberg, R., Performance of Air-Cathode Microbial Fuel Cells with Layered-Electrode Assemblies. International Water Association Young Water Professionals Conference, Berkeley, CA - July 2008
12. **Shea, C.** and Nerenberg, R. Air-cathode microbial fuel cells with layered-electrode assemblies. International Water Association Leading Edge Technologies, Zurich, Switzerland - June 2008
13. **Shea, C.** and Nerenberg, R. Adapting a Denitrifying Biocathode for Perchlorate Reduction. International Water Association Leading Edge Technologies, Zurich, Switzerland - June 2008

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14. **Shea, C.** and Nerenberg, R. Air-cathode microbial fuel cells with layered-electrode assemblies. Microbial Fuel Cells - First International Symposium, Pennsylvania State University, State College, PA - May 2008
15. **Shea, C.** and Nerenberg, R. Hollow-Fiber Membrane Microbial Fuel Cells: Retrofitting Activated Sludge for Direct Production of Electricity. Indiana Water Environment Federation Annual Conference, Indianapolis, IN - November 2007
16. McStay, F., Talley, J.W., **Shea, C. A.** Landfarming as a Bioremediation Techniques for Oil Contaminated Lands in Iraq. National Association for Environmental Professionals Annual Conference (NAEP), Alexandria, VA - April, 2005
17. Strom, S., Jaffray, S., Johnson, C., McCartney, J., Rossmeier, K., **Shea, C.**, Zhang, M., Changes in Spatial Perception as a Result of Changes in Gravity, Society of Women Engineers National Conference, Birmingham, AL - 2003

Conference Abstracts

* indicates graduate advisees

** indicates undergraduate advisees

1. Spedding, C, D'Andrea, L., Dozier, C., Reckhow, D., and **Butler, C.**, Pharmaceuticals and Personal Care Products in Urine-compost from a Community Garden. New England Water Environment Association, Boston, Ma, January 2017
2. **Butler, C.**, Clasby, D. Srinivasan, V., Castro, C. Sathyamoorthy, S., FenGen: Direct Electricity Generation from Biosolids using a Hybrid Fermentation-Bioelectrochemical System. New England Water Environment Association, Boston, Ma, January 2017
3. Clasby, D. Srinivasan, V., Castro, C. Sathyamoorthy, S. and **Butler, C.**, Direct Electricity Generation from Biosolids using a Hybrid Fermentation-Bioelectrochemical System. Water Environment Federation Technical Conference and Exhibition, New Orleans, LA, September 2016
4. Stauch-White, K.*, Kuo-Dahab, C.*, Park, C., **Butler, C.**, Nitrogen cycling in the cultivation oxygenic photogranules for wastewater treatment. IWA MEWE Biofilms, Copenhagen, Denmark, September 2016
5. Srinivasan, V.* and **Butler, C.**, Evaluating the Robustness of Anode-Respiring Biofilms: Understanding the Dynamics of Interactions between Anode-Respiring and Denitrifying Bacteria, New England Graduate Water Research Symposium, Amherst, MA, September 2015
6. Jack, J.* and **Butler, C.**, Inhibition of Methanogenesis in MFC Anode Communities, New England Graduate Water Research Symposium, Amherst, MA, September 2015
7. Stauch-White, K.*, Kuo-Dahab, C.* and **Butler, C.**, The ecology and locational preferences of microalgae and bacteria in granular biofilms used for treating wastewater, New England Graduate Water Research Symposium, Amherst, MA, September 2015
8. Castro, C.*, Vargas, I.* and **Butler, C.**, Azufre River Sediments as an Inoculum for MFCs: Boon or Bane?, New England Graduate Water Research Symposium, Amherst, MA, September 2015

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9. Srinivasan, V.* and **Butler, C.**, Competition between Denitrifiers and Anode-respiring Bacteria, American Chemical Society Meeting, Boston, MA, August 2015
10. Ikuma, K., Kim, S., Reckhow, D., **Butler, C.**, Removal and Transformation of Pharmaceuticals and Personal Care Products by Onsite Wastewater Treatment Systems, Association of Environmental Engineering and Science Professor Conference, Yale University, New Haven, CT June 2015
11. Srinivasan, V.* and **Butler, C.**, Evaluating the Robustness of Anode-Respiring Biofilms: A Battle for Acetate Between Exoelectrogens and Denitrifiers, Association of Environmental Engineering and Science Professor Conference, Yale University, New Haven, CT June 2015
12. Srinivasan, V.* and **Butler, C.**, Evaluating the Robustness of Anode-Respiring Biofilms: A Battle for Acetate Between Exoelectrogens and Denitrifiers, Association of Environmental Engineering and Science Professor Conference, Yale University, New Haven, CT June 2015
13. Stauch-White, K.* , Kuo-Dahab, C.* , Park. C and **Butler, C.**, The ecology of granular biofilms containing microalgae and bacteria used for treating wastewater, Association of Environmental Engineering and Science Professor Conference, Yale University, New Haven, CT June 2015
14. Stauch-White, K.* , Kuo-Dahab, C.* , Milferstedt, K., Hamelin, J., Park. C and **Butler, C.**, Filamentous cyanobacteria in granular biofilms containing microalgae and bacteria, Meeting of the American Chemical Society, Denver, CO March 2015
15. Stauch-White, K.* and **Butler, C.**, Investigation of DNA extraction protocols for granular biofilms containing microalgae and bacteria, New England Graduate Student Water Symposium, Amherst, MA, September 2014
16. Srinivasan, V.* and **Butler, C.**, Competition for electron donors in Anode-Respiring Biofilms, New England Graduate Student Water Symposium, Amherst, MA, September 2014
17. Castro, C.* , and **Butler, C.**, Large scale MFC for organic and nitrogen removal from synthetic human waste., North American Meeting of the International Society of Microbial Electrochemistry and Technology, State College, PA, May 2014
18. Srinivasan, V.* and **Butler, C.**, Competition for electron donors in Anode-Respiring Biofilms, North American Meeting of the International Society of Microbial Electrochemistry and Technology, State College, PA, May 2014
19. Castro, C.* , and **Butler, C.**, Microbial Fuel Cell for Nutrient and Organic Removal from Domestic Waste on Cape Cod, Smarter Cape Cod Economic Summit, May 2014
20. Castro, C.* , and **Butler, C.**, The MFC Latrine: Electricity-yielding, Decentralized Wastewater treatment for Rural Areas., New England Water Environment Association Energy and Sustainability Joint Specialty Conference, Sturbridge, MA, May 2014
21. Castro, C.* , Goodwill, J.* , Rogers, B., Henderson, M., **Butler, C.**, Decentralized Organic and Nitrogen Removal from Domestic Waste in Rural Ghana with a Microbial Fuel Cell, New England Water Environment Association, Boston, MA, January 2013
22. Srinivasan, V.* , Castro, C, Weinrich, J.* and **Butler, C.** , Wastewater Treatment and Bioelectrochemical Systems. Joint NSF-GOI Workshop on Implementation of

Sustainable Technologies for Water / Wastewater Treatment and Water Reuse, Chennai, India, January 2013

23. Castro, C.*, Goodwill, J.*, Rogers, B., Henderson, M., **Butler, C.**, Decentralized Organic and Nitrogen Removal from Domestic Waste in Rural Ghana with a Microbial Fuel Cell, Fecal Sludge Management Conference, Durban, South Africa, November, 2012
24. Weinrich, J.*, **Butler, C.**, Kinetics of nitrate-reduction and nitrite-accumulation in a denitrifying biocathode, North American Meeting of the International Society of Microbial Electrochemical Technologies , Cornell, NY, October 2012
25. Castro, C.*, Goodwill, J.*, **Butler, C.**, Decentralized Organic and Nitrogen Removal from Domestic Waste in Rural Ghana with a Microbial Fuel Cell, North American Meeting of the International Society of Microbial Electrochemical Technologies , Cornell, NY, October 2012
26. Castro, C.*, Goodwill, J.*, **Butler, C.**, Development of the First Microbial Fuel Cell Composting Latrine, WEFTEC, New Orleans, LA, October 2012
27. Dalrymple, O., Bekki, J., **Butler, C.**, Work in Progress: Modifying Mastery Based Learning for use in Undergraduate Engineering Courses, Frontiers in Education, Rapid City, SD, October 2011
28. Dulebohn, D.***, Reidhead, P.***, and **Butler, C.**, Sustainable Organic and Nutrient Removal from Agricultural Waste Streams via Microbial Fuel Cells. International Bioremediation Symposium, Reno, NV, June 2011
29. Nerenberg, R., Downing, L., Martin, K., **Butler, C.**, and Read-Daily, B., Advances in Hollow-Fiber Membrane Biofilm Reactor (MBfR) Technology for Water and Wastewater Treatment, Borchardt Conference, Ann Arbor, MI, February 2011
30. Brown, D.***, Burns, B.***, Cradic, Z.***, Petrakovitz, D.***, Reeg, M.***, Santos, N.***, and **Butler, C.**, Civil Infrastructure Challenges in Ghana, Africa. Student Design Competition, National Academy of Engineering Grand Challenges Summit, Phoenix, AZ, April 2010
31. **Butler C.**, Clauwaert, P., Verstraete, W., and Nerenberg, R., Bioelectrochemical perchlorate reduction in a microbial fuel cell. ACS National Meeting, San Francisco, CA - March 2010
32. **Butler C.**, Pavissich, J.P., and Nerenberg, R., Total Nitrogen Removal in a Microbial Fuel Cell, ACS National Meeting, San Francisco, CA - March 2010
33. **Butler, C.** and Nerenberg, R., Impact of oxygen crossover on layered electrode assembly, air cathode MFCs. American Chemical Society National Meeting, San Francisco, CA - March 2010
34. **Shea, C.** and Nerenberg, R., Effect of oxygen crossover on microbial fuel cell biofilms. IWA Processes in Biofilms, University of California, Davis - September 2009
35. **Shea, C.** and Nerenberg, R., Bioelectrochemical perchlorate reduction in a microbial fuel cell. IWA Processes in Biofilms, University of California, Davis - September 2009
36. **Shea, C.** and Nerenberg, R. Air-cathode microbial fuel cells with layered-electrode assemblies. Microbial Fuel Cells - First International Symposium, Pennsylvania State University, State College, PA - May 2008

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37. **Shea, C.** and Nerenberg, R. Microbial Fuel Cell for Total Nitrogen Removal. Microbial Fuel Cells - First International Symposium, Pennsylvania State University, State College, PA - May 2008
38. **Shea C.**, Clauwaert, P., Verstraete, W., and Nerenberg, R. Adapting a Denitrifying Biocathode for Perchlorate Reduction. Microbial Fuel Cells - First International Symposium, Pennsylvania State University, State College, PA - May 2008
39. Wilbur, P.* and **Shea, C.**, Proton Exchange Membranes in Microbial Fuel Cells. Undergraduate Scholars Conference, University of Notre Dame, May 2008
40. Nerenberg, R. and **Shea, C.**, Microbial Fuel Cells for Sustainable Energy Production from Wastewater, Biofuels Symposium, Purdue University, September 2007
41. **Shea, C.**, Green, S.J., Nerenberg, R., Microbial Fuel Cells: Changes in Microbial Community Structure as a Function of Anode Potential. Fourth American Society for Microbiology Conference on Biofilms, Quebec City, Quebec - March 2007
42. **Shea, C.**, Johnson, C., Strom, S., Rossmeier K., Zhang, M., Jaffray, S., McCartney, J., Changes in Spatial Orientation and Vestibular Behavior as a Result of Changes in Gravity. Collaboration Celebration, Smith College, Northampton, Ma - April 2003
43. **Shea, C.** and Queeney, K.T., Mechanistic Study of the Oxidation of H-terminated Silicon: The Role of Dissolved Oxygen. American Vacuum Society International Symposium, Baltimore, MD - November 2003
44. **Shea, C.** and Voss, S.E., Intra-subject versus Inter-subject variability of the Impedance of the Human Ear Canal. Association for Research in Otolaryngology Midwinter Meeting, St. Petersburg, FL - January 2002

Invited Panels, Presentations, and Seminars

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1. **Butler, C.** Energy and Resource Recovery in Wastewater Treatment, Water Innovation Workshop, Worcester Polytechnic Institute, Worcester, MA, October 2016
 2. **Butler, C.** Resource Recovery in Wastewater Treatment, Harvard University, Cambridge, MA, September 2015
 3. **Butler, C.**, Backer, S., Sherer, R., Work-Life Balance, Senior Design Clinic, Smith College, April 2015
 4. **Butler, C.** Bioelectricity Generation from Wastewater Treatment, State University of New York Polytechnic, Albany, NY, 2014
 5. **Butler, C.**, Hooker, B., Klare, M., Global Trends Forum, Smith-Tuck Global Leaders Program for Women, Smith College, 2014
 6. **Butler, C.**, Decentralized, electricity-producing biological treatment of organic and nitrogen components of domestic waste, Northeast Bioengineering Conference, Northeastern, May 2014
 7. Burnside, A, **Butler, C**, Holmes, D., McKeown, K.A., Rapp, L, Academic Career Panel, Exploring Careers in Academia, Graduate Women in STEM, UMass, December 2013
 8. **Butler, C.**, Life after Smith and Engineering Design for the Developing World, Introduction to Engineering in the Department of Engineering, Smith College, Northampton, MA - October 2013

9. **Butler, C.**, Sustainable Sanitation Solutions for the Developing World, Introduction to Engineering in the Department of Engineering, Smith College, Northampton, MA - November 2012
10. **Butler, C.**, The Microbial Fuel Cell Latrine, Holyoke Community College, Holyoke, MA - November 2012
11. **Butler, C.** Bioelectrochemical Systems: opportunities for energy recovery while meeting treatment objectives, BioWET: Biological Waste to Energy Summer School, University of South Florida, Tampa, FL - July 2012
12. **Butler, C.** International Society for Industrial Ecology Future Faculty Workshop, IEEE International Symposium for Sustainable Systems and Technology, Boston, MA - May 2012
13. **Butler, C.** Bioelectricity Generation from Wastewater Treatment: Opportunities for Sustainability, Department of Civil Engineering, University of Massachusetts, Dartmouth, Dartmouth, MA - February 2012
14. **Butler, C.** Fundamental and Applied Studies of Microbial Fuel Cells for Sustainable Water and Wastewater Treatment, Environmental and Water Resources Engineering Department, Tufts University, Medford, MA - February 2012
15. Chen, Q., **Butler, C.**, Green, D., Hristovski, K., McKenna, A., Tridane, A., Undergraduate Research. Annual College Retreat, College of Technology and Innovation, Arizona State University, Mesa, AZ - January 2011
16. **Butler, C.** Performance and Microbial Ecology of Microbial Fuel Cells with Biocathodes. North American BioElectric Systems Meeting, University of Massachusetts, Amherst, MA - October 2010
17. **Butler, C.**, Fundamental and Applied Studies of Microbial Fuel Cells for Sustainable Water and Wastewater Treatment. School of Sustainable Engineering and the Built Environment, Arizona State University, Tempe, AZ - February 2010
18. Chantem, T., McCumbers, R., **Shea, C.**, Building Community Through Improved Communication. Midwest Regional Conference of the National Association of Graduate and Professional Students, Notre Dame, IN - March 2009
19. Chantem, T., McCumbers, R., **Shea, C.**, Graduate Student Union - Progress and Future Goals. University of Notre Dame Board of Trustees, Notre Dame, IN - October 2008
20. Chantem, T., McCumbers, R., **Shea, C.**, Graduate Student Union - State of the Union Report. University of Notre Dame Board of Trustees, Notre Dame, IN - October 2007
21. **Shea, C.**, Sausville-Giddings, C., Taugher, M., Biological Nitrogen Removal via Partial Nitrification and Denitrification. Metcalf and Eddy, New York, New York - May 2004

Funded Projects

Total as a PI: \$731,600

Total as a co-PI: \$7,677,000

1. *GOALI: Advancing the Oxygenic Photogranule Process for Energy Positive Wastewater Treatment*, PI: C. Park, co-PI: **C. Butler** and C. Wilson, National Science Foundation, June 2016-May 2019, Funding Awarded: \$330,000
2. *Microbial attenuation of non-point source pharmaceutical and personal care products pollution from antiquated septic systems in coastal communities*, PI: **C. Butler**, co-PI: K. Ikuma, Massachusetts Water Resources Research Center/USGS, March 2015-February 2016, Funding Awarded: \$30,000
3. *NSF CAREER: Fundamental Studies of Cross-Kingdom Aggregate Biofilms for Energy-Efficient Wastewater Treatment*, PI: **C. Butler**, National Science Foundation, June 2015-May 2020, Funding Awarded: \$500,000
4. *NSF MRI: Acquisition of A Versatile High Resolution MS System for Determination of Small Molecules of Environmental and Health Concern*, PI: David Reckhow, co-PIs: C. Park, J. Tobiason, **C. Butler**, National Science Foundation Major Research Instrumentation Opportunity, September 2014-August 2016, Funding Awarded: \$455,000
5. *Enhanced Fuel Cells From Wastewater Treatment*, PIs: **C. Butler**, M. White, Air Force Small Business Innovation Research Grant, July 2014-June 2015, Funding Awarded: \$149,582
6. *Water Innovation Network for Sustainable Small Systems (WINSSS)*, National Center for Innovation in Small Drinking Water Systems, PI: David Reckhow, co-PIs: Tobiason, John; **Butler, Caitlyn**; Park, Chul; Shenoy, Prashant; Lawler, Desmond; Kirisits, Mary J.; Katz, Lynn; Kinney, Kerry; Speitel, Gerald; Saleh, Navid; Dvorak, Bruce; Ray, Chittaranjan; Lai, Rebecca; Wilson, Steve; Boyer, Treavor; Zhang, Qiong; Brown, Jess, Environmental Protection Agency, July 2014-June 2017, Funding Awarded: \$4,099,999
7. *Elucidating Novel Algal-Sludge Granule for Wastewater Treatment and Biomethane Feedstock Production*, PI: Chul Park, co-PI: **C. Butler**, National Science Foundation Chemical, Bioengineering, Environmental and Transport Systems, September 2013-August 2016, Funding Awarded: \$342,368
8. *Phase II: The Microbial Fuel Cell Latrine - Enhanced Electricity Recovery from Domestic Waste and Expanded Deployment*, PI: **C. Butler**, co-PIs: Mark Henderson and Brad Rogers, Gates Grand Challenges Explorations, May 2013-April 2015, Funding Awarded: \$100,000
9. *Electrofuels via Direct Electron Transfer from Electrodes to Microbes* PI: D. Lovley, co-PIs: K. Nevin, **C. Butler** and T. Russell, Applied Research Project Agency - Energy (ARPA-E), January 2012-June 2013, Funding Awarded: \$2,300,000
10. *Adapting Traditional Pit Latrine in the Developing World for Nitrogen Removal and Electricity Production* PI: **C. Butler**, Co-PIs: M. Henderson and B. Rogers, Gates Foundation Grand Challenges Explorations, November 2011-May 2013, Funding Awarded: \$100,000
11. *Organics and Nitrogen Removal from Agricultural Waste Streams via Microbial Fuel Cells* PI: **C. Butler**, Western Alliance for Extending Student Opportunities, June 2009-August 2009, Funding Awarded: \$1600 for an undergraduate research assistant and supplies.

Internally-Supported Projects

Total: \$63,420

Office of Research Development, University of Massachusetts, Amherst, MA

1. *Characterization of Pharmaceuticals in Urine-compost at the Grow Food Northampton Community Organic Garden.* PI: **C. Butler**, co-PI: D. Reckhow, Funding Awarded: \$10,000, July 2016-June 2017

Department of Engineering, College of Technology and Innovation, Arizona State University, Mesa, AZ

1. *Capital Equipment and Undergraduate Student Support for Molecular Analysis of Biocathode Biofilms* PI: **C. Butler**, Funding Awarded: \$35,720
2. *Modified Mastery-based Learning in Engineering Courses*
PIs: J. Bekki, **C. Butler**, and O. Dalrymple Funding Awarded: \$2000

Graduate School and College of Engineering, University of Notre Dame, Notre Dame, IN

1. *First Annual Graduate Research Symposium*
Co-PIs: McCumbers, R., Chantem, T., **Shea, C.** Graduate School Professional Development Funding Opportunity, Funding Awarded: \$12,200
2. *Integration of Energy Topics into Environmental Biotechnology and Wastewater Treatment Design*
PI: Nerenberg, R. and co-PI: **Shea, C.**, Notre Dame Energy Center Curriculum Development Grant, Funding Awarded: \$3,500

Travel Awards

1. *Downes Travel Grant*
for travel to International Microbial Fuel Cell Symposium Laboratory Workshop, Pennsylvania State University, University Park, PA. Supported by the Graduate School at the University of Notre Dame
2. *International MFC Symposium Student Travel Grant*
for travel to present at the International Microbial Fuel Cell Symposium, Pennsylvania State University, University Park, PA. Supported by Office of Naval Research
3. *IWA Young Water Professionals Conference Travel Support*
for travel to present at the International Water Association Young Water Professional Conference, Berkeley, CA.

Professional Activities

National Science Foundation CAREER Review Panel, 2016, 2015 - CBET, Environmental Engineering

Ad Hoc Proposal Reviewer, 2016, Canadian Research Chairs Program, Tier II Chair

Guest Editor, 2016, Special issue of Environmental Engineering Science, Innovative Global Solutions for Bioenergy Production.

Ad Hoc Proposal Reviewer, 2016, USDA SBIR Phase II

Invited Participant, 2016, NSF/WEF/DOE Workshop for Creating Metrics for a National Wastewater Testbed Network, Washington, D.C.

Ad Hoc Proposal Reviewer, 2015 - Israeli Ministry of Science, Technology and Space - Division of Applied Engineering Research

Reviewer, 2015 - International Society for Microbial Electrochemistry and Technology Awards

Invited Participant, 2014 Sustainable and Resilient Water Solutions for Rural Communities Workshop, Glasgow University, Scotland

Advisory Board - 2014 North American Meeting of International Society for Microbial Electrochemistry and Technology

Membership Committee Member - International Society for Microbial Electrochemistry and Technology- 2013-2014

Lecturers Committee Member - Association of Environmental Engineering and Science Professor - 2013-present

Biofilm Interest Group Member - Water Environment Federation - 2012-2013

Session Chair/Organizer - Microbial-based Fuel Cells - International Symposium on Bioremediation and Sustainable Environmental Technologies, 2011

Session Moderator - Microbial Fuel Cells - Water Environment Federation/ International Water Association Biofilm Reactor Technology Conference, 2010

Scientific Committee - Young Professional Member - Water Environment Federation/ International Water Association Biofilm Reactor Technology Conference, 2010

National Science Foundation Review Panel, CCLI (now called TUES), 2010

Ad Hoc Reviewer - Applied Microbiology and Biotechnology, Biofouling, Bioresource Technology, Biotechnology and Bioengineering, Environmental Engineering Science, Environmental Science: Water Science and Technology, IWA Journal for Water, Sanitation and Hygiene Development, Environmental Science and Technology, Water Research, and Water Science and Technology, 2007-present

Session Moderator - Water Quality and Availability - Notre Dame Environmental Education and Research Symposium, 2006

Professional Memberships

Association of Environmental Engineering and Science Professors (AEESP)
American Society of Engineering Education (ASEE)
International Water Association (IWA)
Water Environment Federation (WEF)
American Chemical Society (ACS)

University and Department Service

University of Massachusetts, Amherst, MA

Ad Hoc Reviewer, 2016, Office of Research Development, Faculty Research Grant

College of Engineering, University of Massachusetts, Amherst, MA

CEE Water Resources Search Committee, 2015-2016, performing a faculty search in the area of water resources

CEE History and Heritage Lecture Committee, 2015-2016, will organize the 2016 History and Heritage Lecture

CAREER Award Panel, April 2015, served on a panel of CAREER awardees to share our experiences of preparing a successful CAREER proposal

Ph.D. Exams, Summer 2016, Summer 2015, Summer 2014, Summer 2013, Winter 2013, created, administered and graded the Biological Principles Exams for EWRE Ph.D. students and served on Oral Exam committee for students.

Engineering Open House, Spring 2016, Spring 2015, Fall 2014, Fall 2013, gave presentations and coordinated environmental engineering activities for prospective undergraduate students.

New Student Orientation, Summer 2012-2016, advised incoming first-year students on their first semester coursework

CEE Alumni Networking Social, June 2014, organized a CEE Alumni Networking Social with invited speaker John Sullivan of Boston Water and Sewer Commission, raising **\$10,000 in sponsorship and ticket sales**

Revision of Course Performance Indicators for Introduction to Environmental and Water Resource Engineering, March 2014, lead the revision of CPIs for CEE 370 amongst a group of past and future instructors of the course

Engineering Career Day, March 2013, developed an environmental engineering activity for an event to introduce female high school students to engineering careers

Department of Engineering, College of Technology and Innovation, Arizona State University, Mesa, AZ

Civil Engineering Focus Area Committee, 2010-2011- served on a committee to redevelop the curriculum for the Civil Engineering focus area for the Department of Engineering

Combined First Year Curriculum Committee, 2010-2011 - served on a committee to review and revise curricula for combined first year project-based courses for the Departments of Engineering and Computing Studies

Undergraduate Committee, 2010-2011 - served on a committee to strengthen the undergraduate education within the Department of Engineering

College of Technology and Innovation Writing Group, 2010-2011, - collaborated with a collective of faculty to share and review documents related to our professional development

Graduate School, University of Notre Dame, Notre Dame, IN

Career Center Student Advisory Board, 2008-2009, - served on an advisory board to assist the career center in addressing the needs of graduate students searching for academic and industry-based employment after graduation.

Fellowship and Grant Writing Committee, 2008-2009 - served on a committee assembled by the Dean of the Graduate School to evaluate resources available to graduate students for producing competitive proposal and fellowship applications

Vice President of the Graduate Student Union, 2007-2009 - Notable accomplishments include:

Received 2007-2008 Program Award - National Association of Graduate and Professional Students

Held first University of Notre Dame Graduate Research Symposium

Began preventative health care program for spouses and children of graduate students

Increased Conference Presentation Grant annual and lifetime cap

Redesigned website and created monthly newsletter

Faculty Senate, 2007-2009 - served as the graduate student representative to the Faculty Senate