Christopher M. Sales

Associate Professor

Department of Civil, Architectural, and Environmental Engineering

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EDUCATION

Ph.D., Civil and Environmental Engineering 2012
University of California, Berkeley, CA

M.S., Civil and Environmental Engineering 2006
University of California, Berkeley, CA

B.S.E., Chemical and Biomolecular Engineering 2005
University of Pennsylvania, Philadelphia, PA

B.A., Environmental Studies with Distinction 2005
University of Pennsylvania, Philadelphia, PA

PROFESSIONAL EXPERIENCE

Associate Professor 2019-present
Department of Civil, Architectural, and Environmental Engineering
Drexel University, Philadelphia, PA

Assistant Professor 2013-2019
Department of Civil, Architectural, and Environmental Engineering
Drexel University, Philadelphia, PA

Post-doctoral Researcher 2012-2013
Department of Civil, Architectural, and Environmental Engineering
Drexel University, Philadelphia, PA

Adjunct Professor 2012-2013
Department of Civil, Architectural, & Environmental Engineering
Drexel University, Philadelphia, PA

RESEARCH EXPERIENCE

Affiliated Researcher 2018-present
C&J Nyheim Plasma Institute
Drexel University, Philadelphia, PA

- Research and development of cold (non-equilibrium) plasma discharges for environmental and agriculture applications

Post-Doctoral Researcher 2012-2013
Department of Civil, Architectural and Environmental Engineering
Office of the Dean of Engineering
Drexel University, Philadelphia, PA
Advisor: Joseph B. Hughes, Ph.D., P.E., D.E.E.

- Bioremediation of soils contaminated with nitroaromatics in laboratory-scale, pilot-scale, and field-scale systems

Post-Doctoral Researcher 2012-2013
Department of Civil, Architectural and Environmental Engineering
Drexel University, Philadelphia, PA
Principal Investigator(s): Mira S. Olson, Ph.D. (Drexel University) and Wen K. Shieh, Ph.D. (University of Pennsylvania)

- Design and evaluation of combined microalgae and bacterial systems for treatment of wastewaters and production of commodities and bioenergy

Doctoral Researcher 2006-2012
Department of Civil and Environmental Engineering
University of California, Berkeley, CA
Advisor: Lisa Alvarez-Cohen, Ph.D.

- Functional genomics analysis of the 1,4-dioxane degrading bacterial strain *Pseudonocardia dioxanvorans* strain CB1190.
- Comparative genomics of the family *Pseudonocardiaceae.*
- Molecular biology and microbiology studies of bacterial biodegradation of the emerging water contaminants, 1,4-dioxane and *N*-nitrosodimethylamine.

Affiliated Researcher 2010-2012
Earth Sciences Division
Lawrence Berkeley National Laboratory, Berkeley, CA
Collaborator: Gary Andersen, Ph.D.

- Microarray transcriptomics of *Pseudonocardia dioxanivorans* strain CB1190

Visiting Researcher 2006
Department of Microbiology and Immunology
University of British Columbia, Vancouver, Canada.
Collaborators: William Mohn, Ph.D. and Lindsay Eltis, Ph.D.

- Functional genomics analysis of propane-induced biodegradation of *N*-nitrosodimethylamine by *Rhodococcus jostii* RHA1.

Research Assistant 2002-2005
Department of Chemical and Biomolecular Engineering
University of Pennsylvania, Philadelphia, PA
Advisor: Wen K. Shieh

- Designed and evaluated the performance of novel bioreactor systems for wastewater treatment and continuous fermentation

HONORS AND AWARDS

1. Spring 2018 Teaching and Learning Conference Travel Award. April 2018. $1,000 Award.

   **Used for travel costs to attend and present at 125th American Society of Engineering Education (ASEE) Annual Conference & Exposition in Salt Lake City, UT, June 24-27, 2018.*

2. 2017 Outstanding Alumnus of the University of Pennsylvania Chemical and Biomolecular Engineering Department. American Institute of Chemical Engineers – Delaware Valley Section. April 2017.

3. Harry C. Bartels, Endowed Faculty Engineering Development Fund, 2014. Drexel University. $20,000 Award.

4. International Travel Award. July 2014. Office of International Programs, Drexel University. $500 Award.

   **Used for travel costs to attend and present at the 15th International Symposium on Microbial Ecology (ISME-15) in Seoul, South Korea, August 24-28, 2014.*

5. Appreciation Award from The Greater Philadelphia Region NSF Louis Stokes Alliance for Minority Participation (LSAMP), November 16, 2013. "For dedication, continuous inspiration, and outstanding contribution to science and engineering students."

PEER-REVIEWED PUBLICATIONS

1. Ebrahimi, F., Lewis, A. **Sales, C.M.**, Suri, R., and E.R. McKenzie. 2020. Linking PFAS parititoning behavior in sewage sludge to solution chemistry and treatment processes. (*in review*)

2. Nan, Y.*, Price, J.R*., Wang, Y., Cheng, M. Keshani Langroodi, S., Woloszynek, S., Rosen, G.L., Yuan, L., and **C.M. Sales**. 2020. Evidence of predation and parasitism affecting EBPR performance through microbial community instability. (*in review*)

**Both authors contributed equally to this manuscript.*

3. Price, J.R. and **C.M. Sales**. 2020. Quantifying the influence of nutrient loading and availability on microbial community dynamics and subsequent kinetic behavior. (*in review*)

4. Bradley, T.C., Haas, C.N., and C.M. Sales. 2020. Nitrification in Premise Plumbing: A Review. *Water*. (accepted).

5. Minerovic, A.D., Potapova, M.G., **Sales, C.M.**, Price, J.R., and M.D. Enache. 2020. 18S-V9 DNA metabarcoding detects the effect of water-quality impairment on stream biofilm eukaryotic assemblages. *Ecological Indicators*. 113:106225.

6. Lewis, A., Joyce, T*., Hadaya, M., Ebrahimi, F., Dragiev, I.*, Giardetti, N.*, Yang, J.*, Fridman, G., Rabinovich, A., Fridman, A.A. McKenzie, E.R., and **C.M. Sales.** 2020. Rapid degradation of PFAS in aqueous solutions by revere vortex flow gliding arc plasma. *Environ. Sci.: Water Res. Technol.* DOI*:* 10.1039/C9EW01050E.

   **Undergraduate student authors.*

7. Ksara, M.*, Newkirk, R.*, Keshani Langroodi, S., Althoey, F., **Sales, C.M.**, Schauer, C.L., and Y. Farnam. 2019. Microbial Damage Mitigation Strategy in Cementitious Materials Exposed to Calcium Chloride. *Constr. Build Mater.* 195:1-9.

   **Undergraduate student authors.*

8. Price, J.R., Ledford, S.H., Ryan, M.O., Toran, L., and **C.M. Sales**. 2018. Wastewater treatment plant effluent introduces recoverable shifts in microbial community composition in receiving streams. *Sci. Total Environ.* 613-614:1104-1116.

9. Sniffen, K.D., **Sales, C.M.**, and M.S. Olson. 2018. The fate of nitrogen through algal treatment of landfill leachate. *Algal Res.* 30:50-58.

10. Sniffen, K.D., Price, J.R., **Sales, C.M.**, and M.S. Olson. 2017. Influence of scale on biomass growth and nutrient removal in an algal-bacterial leachate treatment system. *Environ. Sci. Technol.* 51(22):13344-13352.

11. Sniffen, K.D., **Sales, C.M.**, and M.S. Olson. 2017 Comparison of Scale in a Photosynthetic Reactor System for Algal Remediation of Wastewater. *J. Vis. Exp.* e55256-e55256.

12. Nayak, S., O'Donnell*, S.-E., **Sales, C.M.**, and R.V. Tikekar. 2016. Fructose accelerates UV-C induced photochemical degradation of pentachlorophenol in low and high salinity water. *J. Agric. Food Chem.* 64(21):4214-4219.

    **Undergraduate student authors.*

13. Price, J.R., Keshani Langroodi, S., Lan, Y., Becker, J.M., Shieh, W.K., Rosen., G.L., and **C.M. Sales**. 2016. Untangling the microbial ecosystem and kinetics in a nitrogen removing photosynthetic high density bioreactor. *Environ. Sci.: Water Res. Technol.* DOI: 10.1039/c6ew00078a.

14. Nayak, S., **Sales, C.M.**, Muniz, J., and R.V. Tikekar. 2016. Fructose as a novel photosensitizer: Characterization of reactive oxygen species and an application in degradation of diuron and chlorpyrifos. *Chemosphere*. 144:1690-1697.

15. Sniffen, K.D., **Sales, C.M.**, and M.S. Olson. 2016. Nitrogen removal from raw landfill leachate by an algae-bacteria consortium. *Water Sci. Technol.* DOI: 10.2166/wst.2015.499

16. Price, J.R., Shieh, W.K., and **CM. Sales**. 2015. A novel bioreactor for high density cultivation of diverse microbial communities. *J. Vis. Exp*. 106:e53443.

17. **Sales, C.M.** and P.K.H. Lee. 2015. Resource recovery from wastewater: application of meta-omics to phosphorus and carbon management. *Curr. Opin. Biotechnol.* 26(33):260-267.

18. Ramanathan, G., **Sales, C.M.**, and W. K. Shieh. 2014. Simultaneous autotrophic denitrification and nitrification in a low-oxygen reaction environment. *Water Sci. Technol.* doi:10.2166/wst.2014.292

19. **Sales, C.M.**, Grostern, A., Parales, J.V., Parales, R.E., and L. Alvarez-Cohen. 2013. Oxidation of the cyclic ethers 1,4-dioxane and tetrahydrofuran by a monooxygenase in two *Pseudonocardia* species. *Appl. Environ. Microbiol.* 79(24):7702-7708.

20. Gedalanga, P., Kotay, S.M, **Sales, C.M.**, Butler, C.S., Goel, R., and Mahendra, S. 2013. Novel applications of molecular biological and microscopic tools in environmental engineering. *Water Environ. Res.* 85(10):917-950.

21. Grostern, A., **Sales, C.M.**, Zhuang, W.Q., Erbilgin, O., Parales, R.E., and L. Alvarez-Cohen. 2012. Glyoxylate metabolism is a key feature of the metabolic degradation of 1,4-dioxane by *Pseudonocardia dioxanivorans* strain CB1190. *Appl. Environ. Microbiol.* 78:3298-3308.

22. **Sales, C.M.**, Mahendra, S., Grostern, A., Parales, R.E., Goodwin, L., Woyke, T., Nolan, M., Lapidus, A., Chertkov, O., Ovchinnikova, G., Szcyrba, A., and L. Alvarez-Cohen. 2011. Genome sequence of 1,4-dioxane degrading *Pseudonocardia dioxanivorans* strain CB1190. *J. Bacteriol.* 193:4459-4550.

23. Sharp, J.O.*, **Sales, C.M.*** and L. Alvarez-Cohen. 2010. Functional characterization of propane-enhanced *N*-nitrosodimethylamine degradation by two actinomycetales. *Biotechnol. Bioeng.* 107(6):924-932.

    **Both authors contributed equally to this manuscript.*

24. Sharp J.O., **Sales C.M.**, LeBlanc J.C., Liu J., Wood T.K., Eltis L.D., Mohn W.W., and L. Alvarez-Cohen. 2007. An inducible propane monooxygenase is responsible for n-nitrosodimethylamine degradation by *Rhodococcus* sp. Strain RHA1. *Appl. Environ. Microbiol.* 73:6930-6938.

25. **Sales C.M** and W.K. Shieh. 2006. Performance of an aerobic/anaerobic hybrid bioreactor under nitrogen deficient and low F/M conditions. *Water Research* 40(7):1442-1448.

REFEREED CONFERENCE PROCEEDINGS

26. Christe, D., Bhatt, J., **Sales, C.M.**, and Y. Farnam. 2018. Empowering Underrepresented Groups to Excel in STEM Through Research Sprints. 125th American Society of Engineering Education (ASEE) Annual Conference & Exposition. Salt Lake City, UT.

27. Ksara M., Keshani Langroodi, S., Mayerberger, E., Althoey, F., **Sales, C.M.**, Schauer, C., and Y. Farnam. 2017. Evaluating the Potential Use of Alginate to Enable Microbial Self- Healing in Concrete. 6th Int. Conf. Self-Healing Mater., Friedrichshafen, Germany. 1–5.

28. Muth, D., Rodriguez, E., **Sales, C.M.**, Retallick, W.B., and S.W. Churchill. 2005. An Economic and Thermodynamic Evaluation of the Conversion of Natural Gas to Liquid Fuels Using an Ion-Transport Membrane. Proceedings of the 2005 AIChE Annual Meeting. Cincinnati, OH.

PRE-PRINT PUBLICATIONS

29. Price, J. R. Woloszynek, S., Rosen, G. L., and C.M. Sales. 2018 \theseus - An R package for the analysis and visualization of microbial community data. *bioRxiv*, doi:10.1101/295675.

ORAL PRESENTATIONS

1. **Sales, C.M.** 2019. Development of non-thermal plasma applications to the removal of perfluoroalkyl substances (PFASs) from water. 104th Annual Conference of the New Jersey Water Environment Association (NJWEA). Atlantic City, NJ.

2. Price, J.R. and **C.M. Sales**. 2019. Predation, Parasitism, and Performance within EBPRs. 257th National Meeting and Exposition of the American-Chemical-Society (ACS) – Chemistry for New Frontiers. Orlando, FL.

3. **Sales, C.M**., Fridman, A., Rabinovich, A., Fridman, G., Lewis, A.J., Hammouri, R., Hadaya, M., Dragiev, I., Joyce, T., and E.R. McKenzie. 2019. Investigating the application of non-equilibrium cold plasma technologies for the degradation of poly- and perfluoroalkyl substances in aqueous solutions. 257th National Meeting and Exposition of the American-Chemical-Society (ACS) – Chemistry for New Frontiers. Orlando, FL.

4. Price, J.R. and **C.M. Sales**. 2018. Examining nutrient uptake and transformation within photosynthetic microbial communities using a high density bioreactor. 255th National Meeting and Exposition of the American-Chemical-Society (ACS) - Nexus of Food, Energy, and Water. New Orleans, LA.

5. Minerovic, A.D., Potapova. M., Price, J.R., and **C.M. Sales**. 2018. Molecular and morphological characterization of microbial eukaryote diversity and community structure for stream biomonitoring in New Jersey, USA. 2018 International Diatom Symposium. Berlin, Germany.

6. Minerovic, A.D., Potapova. M., Price, J.R., and **C.M. Sales**. 2018. Molecular and morphological characterization of microbial eukaryote diversity and community structure for stream biomonitoring in New Jersey, USA. 2018 Phycological Society of America/International Society of Protistologists Annual Meeting. Vancouver, BC, Canada.

7. **Sales, C.M.** 2017. Development and Use of Molecular Tools for Microbial Source Tracking and Water Quality Characterization: Project Update. Delaware Watershed Research Conference. Philadelphia, PA.

8. Price, J.R., Ryan. M.O., Ledford, S.H., Toran, L. and **C.M. Sales**. 2017. The Impact of Wastewater Treatment Plant Effluent on the Composition of Microbial Communities Within Receiving Streams. Delaware Watershed Research Conference. Philadelphia, PA.

9. **Sales, C.M.** 2017. Sales Laboratory – Microbes at the nexus of food, energy, and water. AWWA NJ Innovative Water Treatment Technologies and Emerging Research Meeting. New Jersey Institute of Technology. Newark, NJ.

10. **Sales, C.M.**. 2017. Tools for molecular ecology: Peering into the microbial world of engineered and natural systems. Philadelphia Symposium on Cross-Disciplinary Analytical Approaches. Temple University. Philadelphia, PA.

11. Ledford, S.H., Price, Jacob R., Ryan, M., Perez, L.B., **Sales, C.M.**, and L. Toran. 2016. Using a multi-parameter biogeological approach to track the impact of treated sewage discharge on urban streams. *Abstracts with Programs*. 48(7). Denver, CO, USA. Geological Society of America. doi:10.1130/abs/2016AM-286553.

12. **Sales, C.M.** 2015. Application of Functional and Genome-Resolved Metagenomics to Environmental Remediation Systems. Civil and Environmental Engineering Friday Noon Seminar Series at Temple University. Philadelphia, PA.

13. **Sales, C.M.** 2015. Mighty Environmental Microbes: Harnessing Their Powers to Protect Our Water Resources. American Water Resources Association – Philadelphia Metro Area Section Seminar Series. Philadelphia, PA.

14. **Sales, C.M..** 2015. Application of Functional and Genome-Resolved Metagenomics to Environmental Remediation and Biotechnology Systems. Microbiology and Biochemistry Seminar Series at Rutgers University. New Brunswick, NJ.

15. Price, J.R. and **C.M. Sales**. 2015. Microalgae: Harnessing Diverse Metabolisms for Environmental Remediation and Waste Stream Treatment. 2015 Annual Meeting of the Phycological Society of America. Philadelphia, PA.

16. **Sales, C.M.** 2015. Functional Genomics of the Biodegradation of the Emerging Contaminant 1,4-Dioxane. Annual Meeting and Exhibition for the Society of Industrial Microbiology. Philadelphia, PA.

17. **V** 2015 Mighty Environmental Microbes: Harnessing Their Powers for Treatment of Human Waste and Remediation of Pollution. Tapping Our Watershed Seminar Series. Delaware River Watershed Institute. The Academy of Natural Sciences of Drexel University. Philadelphia, PA.

18. **Sales. C.M.** 2014. Application of Functional Genomics to Advance the Biodegradation of Emerging Contaminants. Invited Seminar at the School of Energy and Environment at the City University of Hong Kong, HK.

19. **Sales, C.M.** 2014. Next Generation Molecular Biology Methods for Advancing the Activated Sludge Process. Contributed talk for the workshop celebrating "100th Years of the Activated Sludge Process" at the 99th Annual Conference of the New Jersey Water Environment Association (NJWEA). Atlantic City, NJ.

20. **Sales, C.M.** 2012. Enhancing biodegradation with OMICS: the story of the emerging water contaminants, 1,4-dioxane and N-nitrosodimethylamine (NDMA). Environmental Engineering Seminar Series, Department of Civil, Architectural, and Environmental Engineering, Drexel University. Philadelphia, PA.
21. **Sales, C.M.** 2012. Utilizing "OMICS" to Enhance Biodegradation: A New Guiding Light for Bioremediation Research. Environmental Engineering Seminar Series, Department of Civil and Environmental Engineering, University of California, Los Angeles, CA.
22. **Sales, C.M**. 2007. *N*-nitrosodimethylamine (NDMA), Oxygenases and Bioremediation. Water Quality Seminar Series, Department of Civil and Environmental Engineering, University of California, Berkeley, CA.

POSTER PRESENTATIONS

1. Lewis, A.J., Fridman, G., Fridman, A. Rabinovich, A., McKenzie, E.R., and **C.M. Sales**. 2019. Development of non-thermal plasma technologies for the treatment of poly- and perfluoroalkyl substances (PFASs) and other water contaminants. 2019 AEESP Research and Education Conference. Tempe, AZ.
2. Hammouri, R., Hadaya, M., Dragiev, I., Joyce, T., Fridman, A., Fridman, G., Rabinovich, A., McKenzie, E.R., and **C.M. Sales**. 2018. Application of non-thermal plasma technology for the removal of poly- and perfluorinated substances from investigation derived wastes. SERDP & ESTCP Symposium 2018. Washington, D.C.
3. **Sales, C.M**., Fridman, G., Rabinovich, A., McKenzie, E.R., and A. Fridman. 2018. Development of non-thermal plasma applications to the treatment of poly- and perfluoroalkyl substances (PFASs), an emerging class of water contaminants. 7th International Conference on Plasma Medicine (ICPM-7). Philadelphia, PA.
4. Price, J.R., and **C.M. Sales**. 2017. Linking ecological aspects to photobioreactor operation and performance. 117th General Meetings of the American Society for Microbiology. New Orleans, LA.
5. Price, J.R. and **C.M. Sales.** 2016. Resolving the relationships between photobioreactor influent, microbial diversity and abundance, and reactor performance with a high density bioreactor. International Symposium on Microbial Ecology. Montreal, Canada.
6. Price, J.R., Shieh, W.K., and **C.M. Sales**. 2015. A Novel Photobioreactor for Studying Nitrogen Utilization and Transformation by a Mixed Community of Algae and Bacteria Grown at High Cell Densities. 2015 AEESP Research and Education Conference. New Haven, CT.
7. Sniffen, K.D., **Sales, C.M.**, and M.S. Olson. 2015. Simultaneous bio-remediation of leachate and production of algae for biofuel. 2015 AEESP Research and Education Conference. New Haven, CT.
8. Price, J.R., Shieh, W.K., and **C.M. Sales**. 2015. Nitrogen Removal Dynamics by a Photosynthetic Microbial Community Under High Cell Densities. 2015 Pennsylvania American Water Works Association Annual Conference. Hershey, PA. April 22, 2015.
9. Lan, Y., Stenuit, B., Rosen, G., Hughes, J., Alvarez-Cohen, L., and **C.M. Sales**. 2014. Effects of historical 2,4,6-trinitrotoluene (TNT) contamination and periodic mechanical tillage on soil microbial consortia and remediation activity. 15th International Symposium on Microbial Ecology. Seoul, South Korea.
10. Sniffen, K., **Sales, C.M.**, and Olson, M.S. 2013. Nutrient Removal from Leachate by Bioassimilation. EREF Regional Summit on Sustainable Solid Waste Practices & Research. Philadelphia, PA.
11. Grostern, A., **Sales, C.M.**, and L. Alvarez-Cohen. 2013. Cloning and heterologous functional expression of tetrahydrofuran monooxygenases from *Pseudonocardia* strains in *Rhodococcus jostii* RHA1. 113th General Meetings of the American Society for Microbiology. Denver, CO.
12. **Sales, C.M.**, Han, S.S., and J.B. Hughes. 2013. Biodegradation of dinitrotoluenes in historically contaminated soils without nutrient addition. 2013 RemTEC Summit 2013. Westminster, CO.
13. **Sales, C.M.**, Grostern, A., Mahendra, S., Parales, R.E., and L. Alvarez-Cohen. 2011. The genome sequence of *Pseudonocardia dioxanivorans* strain CB1190. 111th General Meeting of the American Society for Microbiology. New Orleans, LA.

14. Zhuang, W.Q., **Sales, C.M.**, Grostern, A., Feng, X.Y., Tang, Y.J., and L. Alvarez-Cohen. 2011. Demonstration of C2 compounds assimilation pathways in *Pseudonocardia dioxanivorans* CB1190 using ^{13}C isotopic tracer analysis. 111th General Meeting of the American Society for Microbiology. New Orleans, LA.

15. Grostern, A., **Sales, C.M.**, Zhuang, W.Q., Erbilgin, O., Parales, R.E., Mahendra, S., and L. Alvarez-Cohen. 2011. Towards a genetic and biochemical understanding of bacterial 1,4-dioxane metabolism. 111th General Meeting of the American Society for Microbiology. New Orleans, LA.

16. Grostern, A., **Sales, C.M.**, Zhuang, W.Q., Mahendra, S., and L. Alvarez-Cohen. 2010. A genome-enabled investigation of 1,4-dioxane metabolism by *Pseudonocardia dioxanivorans* strain CB1190. 2010 Partners in Environmental Technology Symposium and Workshop, SERDP and ESTCP. Washington, D.C.

17. Grostern, A., **Sales, C.M.**, Mahendra, S., and L. Alvarez-Cohen. 2010. Genome assembly of the 1,4-dioxane degrading *Pseudonocardia dioxanivorans* strain CB1190. ISME-13 Symposium, Microbes – Stewards of a changing planet, International Society for Microbial Ecology. Seattle, WA.

18. **Sales, C.M.**, Grostern, A., Mahendra, S., and L. Alvarez-Cohen. 2010. Identification of monooxygenases involved in 1,4-dioxane biodegradation by *Pseudonocardia dioxanivorans* CB1190. 110th General Meeting of the American Society for Microbiology. San Diego, CA.

19. **Sales, C.M.**, Mahendra, S., Grostern, A., Parales, R.E., and L. Alvarez-Cohen. 2009. Genome sequencing of the 1,4-dioxane-utilizing bacterium *Pseudonocardia dioxanivorans* CB1190. 2009 Partners in Environmental Technology Symposium and Workshop, SERDP and ESTCP. Washington, D.C.

THESES

Sales, C.M. 2012. Functional genomics of bacterial degradation of the emerging contaminants, 1,4-dioxane and *N*-nitrosodimethylamine (NDMA). University of California, Berkeley. Advisor: Alvarez-Cohen, L. Readers: Firestone, M.K. and Neslon, K.L.

Sales, C.M. 2005. Performance Study of a Novel, Aerobic/Anaerobic Hybrid Biological Reactor for Treatment of Wastewater. Environmental Studies Senior Thesis, University of Pennsylvania, Philadelphia, PA.

TEACHING EXPERIENCE

Courses Developed and Taught

ENVE 662: Environmental Engineering Unit Ops – Biological Processes
Department of Civil, Architectural and Environmental Engineering
Drexel University, Philadelphia, PA
(Spring 2019, Spring 2017, Spring 2015, Spring 2013)

ENVE 661: Environmental Engineering Op – Physical & Chemical
Department of Civil, Architectural and Environmental Engineering
Drexel University, Philadelphia, PA
(Spring 2016, Spring 2015, Spring 2014)

ENVE 660: Chemical Processes in Environmental Engineering
Department of Civil, Architectural and Environmental Engineering
Drexel University, Philadelphia, PA
(Winter 2020, Winter 2019, Winter 2018, Winter 2017, Winter 2016, Winter 2015, Winter 2014)

ENVE 316/516: Fundamentals of Environmental Biotechnology
Department of Civil, Architectural and Environmental Engineering
Drexel University, Philadelphia, PA
(Fall 2019, 05Fall 2018, Fall 2017, Fall 2016, Fall 2015, Fall 2014, Fall 2013, Winter 2013)

Courses Taught

CIVE 640/ENVE 435/ENVE 665: Environmental Geotechnics/Groundwater Remediation/Hazardous Waste & Groundwater Remediation
Department of Civil, Architectural and Environmental Engineering
Drexel University, Philadelphia, PA
(Spring 2020)

ENVE 300: Introduction to Environmental Engineering
Department of Civil, Architectural and Environmental Engineering
Drexel University, Philadelphia, PA
(Spring 2018, Spring 2019)

ENVE 486: Environmental Engineering Process Lab I
Department of Civil, Architectural and Environmental Engineering
Drexel University, Philadelphia, PA
(Winter 2017, Winter 2016)

ENVE 302: Environmental Transport and Kinetics
Department of Civil, Architectural and Environmental Engineering
Drexel University, Philadelphia, PA
(Summer 2012)

Guest Lectures
ENVE 421: *Wastewater Treatment*
Department of Civil, Architectural and Environmental Engineering
Drexel University, Philadelphia, PA
(Winter 2017, Winter 2016)

CAEE 202: Introduction to Civil, Architectural & Environmental Engineering
Department of Civil, Architectural and Environmental Engineering
Drexel University, Philadelphia, PA
(Spring 2018, Fall 2017, Spring 2017, Fall 2016)

CAEE 201: Introduction to Infrastructure Engineering
Department of Civil, Architectural and Environmental Engineering
Drexel University, Philadelphia, PA
(Spring 2016, Fall 2015, Spring 2015, Fall 2014, Spring 2014, Fall 2013)

CAEE 210: Measurements in CAEE Engineering
Department of Civil, Architectural and Environmental Engineering
Drexel University, Philadelphia, PA
(Summer 2015, Winter 2015, Summer 2014)

FUNDED PROJECTS

1. NSF I/UCRC (C-PEAB) Special Project: "Antiviral effect of plasma-generated reactive oxygen and nitrogen species for disinfection of personal protective equipment after COVID-19 use." PI: **C.M. Sales**, Co-PIs: M. Waring, A. Fridman, A. Rabinovich (Drexel University). $200,000 award. May 2020 – May 2022.

2. Pennsylvania Department of Environmental Protection (PA-DEP) Project: "Review of human health effects of PFAS in support of MCL development." PI: R. Hamilton. Co-PIs: **C.M. Sales**, M. Kurz, C.N. Haas, R. McKeever, D. Vearrier, Chernak, E. $213,508 award. December 2019 – December 2020.

3. Center for Produce Safety (CPS) Project "Post-Harvest Fresh Produce Wash Water Disinfection by Submerged Cold Plasma Non-Chemical Continuous Treatment System. PI: A. Fridman. Co-PIs: G. Fridman, J. Sekhon, **C.M. Sales**, A, Rabinovich (Drexel University). $298,122 award. January 2020 – December 2021.

4. Environmental Protection Agency (EPA) SBIR Phase II Project "Plasma-Enhancement of Absorbers for Improved Removal of PFOS and PFOA from Water." PI: AA Plasma LLC, Co-PIs: G. Fridman, A. Rabinovich, **C.M. Sales** (Drexel University). $300,000 award. November 2019 – October 2021.

5. Defense Logistics Agency (DLA) Phase II Project: Extending Shelf Life of Strawberries, Spinach, Kale and Lettuce via Non-Equilibrium Short-Pulsed Plasma Activated Water Fog. PI: G. Fridman (AAPlasma), Co-PIs: Co-PIs: J. Sekhon, **C.M. Sales**, A. Rabinovich (Drexel University). $1,000,000 total award (Drexel Subcontract from AAPlasma: $192,297). September 2019 – September 2021.

6. Strategic Environmental Research and Development Program (SERDP) Project ER19-C1-1032 "Uptake and bioaccumulation/biomagnification of subsurface-derived PFASs by lotic, warm water food webs." PI: M. Kurz (Drexel University). Co-Performers: **C.M. Sales** (Drexel University); E.R. McKenzie and R. Suri (Temple University); D. Spooner (Lockhaven University); C. Blakeslee (USGS); M. Gray (Lincoln University). $1,340,000 award. May 2019 – January 2020.

7. Environmental Protection Agency (EPA) SBIR Phase I Project "Plasma-Enhancement of Absorbers for Improved Removal of PFOS and PFOA from Water." PI: AA Plasma LLC, Co-PIs: G. Fridman, A. Rabinovich, **C.M. Sales** (Drexel University). $100,000 award. September 2018 – March 2019.

8. Javits Center research project, "Javits Center Green Roof – Air and Water Quality Monitoring Projects." PI: F. Montalto, Co-PIs: C. Haas, P. DeCarlo, **C.M. Sales** (Drexel University) and J. Cataldo (Cooper Union). $250,000 contract. Sept 2018 – August 2020.

9. National Science Foundation (NSF) Project 1805127 "Collaborative Research: WERF: Determining the role of organic matter quality on PFAS leaching from sewage sludge and biosolids." PI: **C.M. Sales** (Drexel University). Lead Institution PI: E.R. McKenzie (Temple University). $89,957 award. August 2018 – July 2021.

10. Strategic Environmental Research and Development Program (SERDP) Project ER18-L1-1570 "Application of non-thermal plasma technology for the removal of poly- and perfluorinated substances from investigation-derived wastes." PI: **C.M. Sales** (Drexel University). Co-Performers: A. Fridman and A. Rabinovich (Drexel University), E.R. McKenzie (Temple University). $199,667 award. April 2018 – May 2019.

11. Drexel University 2017 Scholarly Material and Research Equipment Award, for purchase of a "Real-time PCR system." PI: **C.M. Sales**. $18,987 award. May 2017. (Drexel Internal)

12. Philadelphia Water Department research project: "Green Infrastructure Living Laboratory (GILL)" PI: F. Montalto, Co-PIs: Y. Kim, M. Olson, **C.M. Sales**. $1,000,000 contract. April 2016 – March 2020.

13. Drexel University College of Medicine Clinical & Translational Research Institute – Genomics Core Facility (CTRI-GCF) Seed Funding Award, "PacBio Amplicon Sequencing for Microbial Source Tracking in the Delaware River Watershed." PI: **C.M. Sales**. $10,000 award. June 2016 – May 2017. (Drexel Internal)

14. William Penn Foundation, Delaware Watershed Consortium Grant, "Development and Use of Molecular Tools for Microbial Source Tracking and Water Quality Characterization." PI: **C.M. Sales**. 2016. Two year. $60,000 award. June 2016 – July 2018.

15. A.J. Drexel Institute for Energy and the Environment (IExE) Seed Grant, "Novel Photochemical and Biological Processes for Decontamination of Flowback Water from Hydraulic Fracturing of the Marcellus Shale." Co-Investigators: R.V. Tikekar and **C.M. Sales**. $50,000 award. June 2014 – October 2015. (Drexel Internal).

STUDENT ADVISING AND MENTORING

Ph.D. Students

Kaitlyn Sniffen, Ph.D. 2017
Dissertation Title: Use of algae in a landfill leachate treatment system

Jacob Price, Ph.D. 2018
Dissertation Title: Linking Complex Kinetics and Molecular Ecology Dynamics within a Photosynthetic Mixed Microbial Community

Saeed Keshani Langroodi, Ph.D. candidate exp. 2020
Application of Metagenomic Binning to Environmental Engineering Biological Processes

Maher Hadaya exp. 2021
Microbial Fuel Cells for Environmental Applications

Angela Fasnacht exp. 2021
Data Science Applications to Water Quality Systems

Tyler Bradley exp. 2023
Data Science Applications to Water Quality Systems

Asa Lewis exp. 2024
Bioaccumulation & Biotranformations of Poly- and Perfluoroalkyl Substances

Jinjie He exp. 2024
Cold plasma technologies for disinfection of bacteria and viruses

M.S. Students

Shaila Nayak, M.S. (Food Sciences) 2015
Thesis Title: UV induced photolysis of fructose: Generation of reactive oxygen species and their application in photo-degradation of pesticides

Taylor Rycroft 2016
Biodegradation of Fluorotelomer chemicals found in AFFF (Independent Study)

Ning Sun 2018
Microbial community dynamics during manure composting

Jinjie He 2018
Water quality of Javits Center Greenroof

Ph.D. Thesis Committees

Yemin Lan, Ph.D. (Biomed) 2015
Dissertation Title: A study of microbial diversity using comparative genomics and comparative metagenomics methods

Kerry Hamilton, Ph.D. (ENVE) 2017
Dissertation Title: Quantitative microbial risk assessment for harvested rainwater, green infrastructure, and reclaimed water

Fadi Althoey, Ph.D. (CAEE) exp. 2019
Dissertation Project: Understanding and mitigating damage development in cementitious exposed to sodium chloride

Undergraduate Students

Kaitlyn Brubaker (BS ENVE '14, Drexel University) 2014
Undergraduate Research Assistant

Timothy Bruckner (BS ENVE '14, Drexel University) 2014
Independent Study

Sean-Erik O'Donnell (BS/MS ENVE '15, Drexel University) 2014-2015
Independent Study/Research Assistant

Melika Riley (BS ENVE '15, Drexel University) 2015
Undergraduate Research Assistant

Breauna Branch (BA Biology '16, Lincoln University) 2015
Louis Stokes Alliance for Minority Participation (LSAMP) Research Scholar

Benjamin Yezuita (BS/MS ENVE '16, Drexel University) 2015
Independent Study

Thomas Thompson (BS/MS ENVE '16, Drexel University) 2015
Undergraduate Research Co-op

Marina D'Souza (BS ENVE exp. '20, Drexel University) 2016-2020
Freshmen Design Project/STAR Scholar '16
Undergraduate Research Assistant

Fatima Hassan (BS ECE exp. '20, Drexel University) 2016
Freshmen Design Project

Juan Francisco Hidalgo (BS CIVE and ENVE, Drexel University) 2016-2017
Independent Study

Kimberly Goins (BS/MS ENVE exp. '19, Drexel University) 2016
Undergraduate Research Assistant

Madeleine Pelchat (BS CBE exp. '21, Drexel University) 2016-2017
Undergraduate Research Assistant

Asfahana Asgar (BS CBE '18, Drexel University) 2017
Undergraduate Research Assistant

Sudipti Attri (BS CBE exp. '21, Drexel University) 2016-2018
Undergraduate Research Assistant

Michael Sangern (BS/MS ENVE '18, Drexel University) 2016-2017
Undergraduate Research Assistant

Shannon Belfield (BS ENVE exp. '21, Drexel University) 2017
STAR Scholar

Melody Wu (BS ENVE exp. '21, Drexel University) 2017
STAR Scholar

Maissoun Ksara 2017
Undergraduate Research Co-op

Laura Council (A.A. '17, CCP, BS CEE exp. '20 Temple University) 2017
Louis Stokes Alliance for Minority Participation (LSAMP) Research Scholar

Kayla Butts (BA Biology exp. '19, Lincoln University) 2018
Louis Stokes Alliance for Minority Participation (LSAMP) Research Scholar

Mikhi Wright (BS Engineering exp. '21, Lincoln University) 2018
Louis Stokes Alliance for Minority Participation (LSAMP) Research Scholar

Elrod Owusu-Asumeng (BS/MS ENVE exp. '21, Drexel University) 2018-2020
Undergraduate Researcher

Shannon Wilbraham (BS ChE exp. 2023, Drexel University) 2019-2020
Undergraduate Researcher

Junchun Yang (BS MEM exp. 2020, Drexel University) 2019-2020
Undergraduate Researcher

Cyrus Sobhani (BS ENVE exp. 2020, Drexel University) 2019-2020
Undergraduate Researcher

High School Students

Kayin Bankole 2014
Franklin Institute STEM Scholar

**Now Majoring in Environmental Engineering at Syracuse University

Semir Ibrahim 2015
Franklin Institute STEM Scholar

Hasan Talouli
Franklin Institute STEM Scholar 2016
**Now Majoring in Computer Science at Drexel University

Bafode Keita 2016
Franklin Institute STEM Scholar
**Now enrolled at Temple University

Briana Johnson 2017
Franklin Institute STEM Scholar
**Now enrolled at Syracuse University

Haitham Talouli 2018
Franklin Institute STEM Scholar

Senior Design Groups Advised

Remediation of Baghurst Drive, Harleysville, PA 2014-2015
(Students: Melika Riley, Nicole Stilwell, Maria Tortorelli, Amy Wetherby)

The Dirt Factory (EPICS) 2014-2015
(Students: Achira Amur, Rebecca Barnes, Frank Kivuyo, Yujie Su, Bai Xue)

Biogas Production in Anaerobic Digestion 2014-2015
(Students: James Cirelli, Leonard Lui, Sean O'Donnell, Alex Newhart)

Friends of the Cresheim Trail (EPICS) 2015-2016
(Students: Dylan Myers, Merissa Gray, Beatrice Mwonga)

Remediation of PFOS and PFOA in Subsurface of NAS JRB Willow Grove 2015-2016
(Students: Azeem Merchant, Samantha Schneider, Benjamin Yezuita)

Low Impact Dredging Method (MEM) 2015-2016
(Students: Edmont Caffarra, David Gockley, Tuyen Christina Hoang, Andrew Johnson, Joy Yingling)

Lightweight Green Roof 2016-2017
(Students: Maxime Damis, Dom Nguyen, Emma Ostrowski, Krystal Stankunas, Alan Waldron)

One Water Management 2017-2018
(Students: Brian Cruice, Christian Gomez, Sitong Chen, Xu Zhihao)

Evaluation of PFAS Destructive Methods 2019-2020
(Students: Keving Leong, Wei Li, Nicholas Enzien, Wei Li, Chongshi Wang)

Freshman Design Groups Advised

Design a reactor to test how algae purifies wastewater 2016
(Students: Marina D'Souza, Fatima Hasan)

Algal Collection and Extraction 2017
(Students: Sudipti Attri, Brahmleen Chaggar, Cheyenne Dwyer, Zachary Hoffman)

Student Awards and Fellowships

Graduate Assistance in Areas of National Need (GANN) Grand Challenges Fellowship
Jacob Price 2015

Kaitlyn Sniffen	2015-2017
Maher Hadaya	2018-present
Claudio Elia Memorial Fellowship	
Jacob Price	2015
The George Hill, Jr. Endowed Fellowship	
Kaitlyn Sniffen	2015
Koerner Family Award in Civil, Architectural, and Environmental Engineering	
Jacob Price	2014
Kaitlyn Sniffen	2015
Professor Wesley O. Pipes Environmental Engineering Student Award	
Kaitlyn Sniffen	2014
Saeed Keshani Langroodi	2018

UNIVERSITY SERVICE

Faculty Senate Nominations Committee (COE Representative)	2017-present
Drexel Libraries Advisory Group (COE Representative)	2017-present
Filipino Intercultural Society of Drexel University (FISDU) (Faculty Advisor)	2017-present
Drexel Liberty Scholars Program (Mentor)	2017-present
Drexel Navigator Program (Navigator)	2015-present
Drexel University Libraries Faculty Fellow (Fellow)	2018
Drexel University's Udall Scholarship Nominations Committee (Reviewer)	2017-2018
Drexel Research Day (Judge)	2013-2018
Drexel Open House Days (Faculty Panelist)	2013-2018
Drexel Smart Initiatives Program (DSIP) Advisory Committee (COE Representative)	2015-2017
Institutional Advancement STEM/STEAM Advisory Board (Participant)	2014-2016

PROFESSIONAL ACTIVITIES

Memberships

American Institute of Chemical Engineers	since 2004
American Society for Microbiology	since 2006
American Society of Civil Engineers	since 2006
American Chemical Society	since 2006
International Society for Microbial Ecology	since 2010
Association of Environmental Engineering Science and Professors	since 2013
Water Environment Federation	since 2013
American Society of Engineering Education	since 2018

Service positions

Journal referee for: Applied Environmental Microbiology, American Institute of Chemical Engineering Journal, BMC Genomics, Ecotoxicology and Environmental Safety, Chemical Engineering & Technology, Chemosphere, FEBS Journal, International Journal of Environmental Research and Public Health, Journal of Environmental Science, Journal of Visualized Experiments, Nature Communications, Preparative Biochemistry and Biotechnology, Scientific Reports, Science of the Total Environment, Waste Management, Water, Water Research

Ad hoc reviewer: Army Research Office, Israel Science Foundation, National Science Foundation, Delaware River Watershed Fund (William Penn Foundation), University of Nebraska (External Proposal Reviewer)

Conference abstract reviewer: Annual Biomedical Research Conferences for Minority Students (ABRCMS)

Professional development

Problem Based Learning Workshop – Drexel University, Philadelphia, PA	2013
CAREER Workshop – AEESP, Golden, CO	2013
Young and Aspiring Faculty Workshop – AEESP, Golden, CO	2013
Academic Portfolio Workshop – Drexel University (DCAE), Philadelphia, PA	2015