

SUDEEP C. POPAT

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EMPLOYMENT

CLEMSON UNIVERSITY

Department of Environmental Engineering and Earth Sciences

Assistant Professor

2016 – now

ARIZONA STATE UNIVERSITY

Swette Center for Environmental Biotechnology, Biodesign Institute

Associate Research Scientist

2013 – 2016

Assistant Research Scientist

2012 – 2013

Postdoctoral Research Associate

2010 – 2012

EDUCATION

UNIVERSITY OF CALIFORNIA, RIVERSIDE

Ph.D., Chemical and Environmental Engineering

2010

SARDAR PATEL UNIVERSITY, INDIA

B.E., Chemical Engineering

2006

SELECTED HONORS AND AWARDS

Young Investigator Oral Presentation, American Society for Microbiology

General Meeting

2014

Discovery Award for Best Scientific Paper, International Society for

Microbial Electrochemistry and Technology

2012

Air & Waste Management Association Student Scholarship

2009

Kreiger & Stewart, Inc. Student Fellowship

2009

Dean's Distinguished Fellowship, University of California, Riverside

2006

TEACHING

AT CLEMSON UNIVERSITY

EES 3040 Wastewater Treatment Systems

Fall 2016, 17

EES 3050 Waste and Wastewater Treatment Laboratory

Fall 2016, 17

AT ARIZONA STATE UNIVERSITY

CHE494 Fuel Cells & Biofuel Cells
CHE598 Electrochemical Energy Conversion and Storage

Fall 2014
Fall 2014

PEER-REVIEWED JOURNAL PUBLICATIONS

1. B. G. Lusk, I. Peraza, G. Albal, A. K. Marcus, **S. C. Popat**, C. I. Torres (2018). pH dependency in anode biofilms of *Thermincola ferriacetica* suggests a proton-dependending electrochemical response. *Journal of the American Chemical Society*, 140, 5527-5534.
2. D. Ki, **S. C. Popat**, B. E. Rittmann, C. I. Torres (2017). H₂O₂ production in microbial electrochemical cells fed with primary sludge. *Environmental Science & Technology*, 51, 6139-6145.
3. M. N. Young, N. Chowdhury, E. Garver, P. J. Evans, **S. C. Popat**, B. E. Rittmann, C. I. Torres (2017). Understanding the impact of operational conditions on performance of microbial peroxide producing cells. *Journal of Power Sources*, 356, 448-458.
4. J. Madjarov, **S. C. Popat**, J. Erben, A. Gotze, R. Zengerle, S. Kerzenmacher (2017). Revisiting methods to characterize bioelectrochemical systems: the influence of uncompensated resistance (iR_u drop), double layer capacitance, and junction potential. *Journal of Power Sources*, 356, 408-418.
5. D. Ki, P. Parameswaran, **S. C. Popat**, B. E. Rittmann, C. I. Torres (2017). Maximizing Coulombic recovery and solids reduction from primary sludge by controlling retention time and pH in a flat-plate microbial electrolysis cell. *Environmental Science: Water Research & Technology*, 3, 333-339.
6. M. J. Patel, **S. C. Popat**, M. A. Deshusses (2017). Determination and correlation of the partition coefficients of 48 volatile organic and environmentally relevant compounds between air and silicone oil. *Chemical Engineering Journal*, 310, 72-78.
7. M. N. Young, M. J. Links, **S. C. Popat**, B. E. Rittmann, C. I. Torres (2016). Tailoring microbial electrochemical cells for production of hydrogen peroxide at high concentrations and efficiencies. *ChemSusChem*, 9, 3345-3352.
8. B. G. Lusk, P. Parameswaran, **S. C. Popat**, B. E. Rittmann, C. I. Torres (2016). The effect of pH and buffer concentration on anode biofilms of *Thermincola ferriacetica*. *Bioelectrochemistry*, 112, 47-52.
9. **S. C. Popat**, C. I. Torres (2016). Critical transport rates that limit the performance of microbial electrochemistry technologies. *Bioresource Technology*, 215, 265-273.
10. D. Ki, **S. C. Popat**, C. I. Torres (2016). Reduced overpotentials in microbial electrolysis cells through improved design, operation, and electrochemical characterization. *Chemical Engineering Journal*, 287, 181-188.
11. O. Sosa-Hernández, **S. C. Popat**, P. Parameswaran, G. S. Alemán-Nava, C. I. Torres, G. B. Méndez, R. P. Saldívar (2016). Application of microbial electrolysis cells to treat spent yeast from an alcoholic fermentation. *Bioresource Technology*, 200, 342-349.
12. R. A. Yoho, **S. C. Popat**, L. Rago, A. Guisasola, C. I. Torres (2015). Anode biofilms of *Geoalkalibacter ferrihydriticus* exhibit electrochemical signatures of multiple electron transport pathways. *Langmuir*, 31, 12552-12559.

13. D. Ki, P. Parameswaran, **S. C. Popat**, B. E. Rittmann, C. I. Torres (2015). Effects of pre-fermentation and pulsed-electric-field treatment of primary sludge in microbial electrochemical cells. *Bioresource Technology*, 195, 83-88.
14. J. Hansen, J. Hogue, G. Sander, R. A. Renaut, **S. C. Popat** (2015). Non-negatively constrained least squares and parameter choice by the residual periodogram for the inversion of electrochemical impedance spectroscopy. *Journal of Computational and Applied Mathematics*, 278, 52-74.
15. R. A. Yoho, **S. C. Popat**, C. I. Torres (2014). Dynamic potential-dependent electron transport pathway shifts in anode biofilms of *Geobacter sulfurreducens*. *ChemSusChem*, 7, 3413-3419.
16. **S. C. Popat**, D. Ki, M. N. Young, B. E. Rittmann, C. I. Torres (2014). Buffer pKa and transport govern the concentration overpotential in electrochemical oxygen reduction at neutral pH. *ChemElectroChem*, 1, 1909-1915.
17. A. G. Delgado, D. Kang, K. G. Nelson, D. Fajardo-Williams, J. F. Miceli, H. Y. Done, **S. C. Popat**, R. Krajmalnik-Brown (2014). Selective enrichment yields robust ethene-producing dechlorinating cultures from microcosms stalled at *cis*-dichloroethene. *PLOS One*, 9, e100654.
18. A. G. Delgado, D. Fajardo-Williams, **S. C. Popat**, C. I. Torres, R. Krajmalnik-Brown (2014). Successful operation of continuous reactors at short retention times results in high-density, fast-rate *Dehalococcoides* dechlorinating cultures. *Applied Microbiology and Biotechnology*, 98, 2729-2737.
19. P. Parameswaran, T. Bry, **S. C. Popat**, B. G. Lusk, B. E. Rittmann, C. I. Torres (2013). Kinetic, electrochemical, and microscopic characterization of the thermophilic, anode-respiring bacterium *Thermincola ferriacetica*. *Environmental Science & Technology*, 47, 4934-4940.
20. M. Ziv-El, **S. C. Popat**, P. Parameswaran, D. Kang, A. Polasko, R. U. Halden, B. E. Rittmann, R. Krajmalnik-Brown (2012). Using electron balances and molecular techniques to assess trichloroethene-induced shifts to a dechlorinating microbial community. *Biotechnology and Bioengineering*, 109, 2230-2239.
21. M. Ziv-El, **S. C. Popat**, K. Cai, R. U. Halden, R. Krajmalnik-Brown, B. E. Rittmann (2012). Managing homoacetogens and methanogens to promote reductive dechlorination of trichloroethene with direct delivery of H₂ in a membrane biofilm reactor. *Biotechnology and Bioengineering*, 109, 2200-2210.
22. **S. C. Popat**, D. Ki, B. E. Rittmann, C. I. Torres (2012). Importance of OH⁻ transport from cathodes in microbial fuel cells. *ChemSusChem*, 5, 1071-1079.
23. **S. C. Popat**, K. Zhao, M. A. Deshusses (2012). Bioaugmentation of an anaerobic biotrickling filter for enhanced conversion of trichloroethene to ethene. *Chemical Engineering Journal*, 183, 98-103.
24. **S. C. Popat**, M. A. Deshusses (2011). Kinetics and inhibition of reductive dechlorination of trichloroethene, *cis*-1,2-dichloroethene and vinyl chloride in a continuously fed anaerobic biofilm reactor. *Environmental Science & Technology*, 45, 1569-1578.
25. **S. C. Popat**, M. V. Yates, M. A. Deshusses (2010). Kinetics of inactivation of indicator pathogens during thermophilic anaerobic digestion. *Water Research*, 44, 5965-5972.

26. **S. C. Popat**, M. A. Deshusses (2010). Analysis of the rate-limiting step of an anaerobic biotrickling filter removing TCE vapors. *Process Biochemistry*, 45, 549-555.
27. **S. C. Popat**, M. A. Deshusses (2009). Reductive dehalogenation of trichloroethene vapors in an anaerobic biotrickling filter. *Environmental Science & Technology*, 43, 7856-7861.
28. O. J. Prado, **S. C. Popat**, G. Chen, S. L. Walker, J. Lafuente, D. Gabriel, M. A. Deshusses (2009). The effect of packing hydrophilization on bacterial attachment and the relationship with the performance of biotrickling filters. *Biotechnology and Bioengineering*, 103, 1060-1067.
29. **S. C. Popat**, M. A. Deshusses (2008). Biological removal of siloxanes from landfill and digester gases: Opportunities and challenges. *Environmental Science & Technology*, 42, 8510-8515.

BOOK CHAPTERS

1. R. A. Yoho, **S. C. Popat**, F. Fabregat-Santiago, S. Giménez, A. ter Heijne, C. I. Torres (2015). Electrochemical impedance spectroscopy as a powerful analytical tool for the study of microbial electrochemical cells. In: *Electrochemically-Active Biofilms in Bioelectrochemical Systems: From Laboratory Practice to Data Interpretation*; eds. H. Beyenal, J. Babauta; John Wiley & Sons, Inc., Hoboken, NJ.

CONFERENCE PRESENTATIONS

(out of >50 platform and poster presentations with co-authored abstracts)

- **S. C. Popat**. Anaerobic biodegradation of fats in wastewater and sludge: Managing the advantage of increased methane against the risk of inhibition. South Carolina Environmental Conference, Myrtle Beach, SC, March 2018.
- **S. C. Popat**, M. N. Young, D. Ki, A. Xie, B. E. Rittmann, C. I. Torres. Factors that affect cathodic hydrogen peroxide production for water and wastewater treatment applications. ACS Annual Fall Meeting, Washington, DC, August 2017.
- **S. C. Popat**, R. A. Yoho, L. Rago, A. Guisasola, C. I. Torres. Unraveling the optimization of energy metabolism in members of *Geobacteraceae* during extracellular respiration. ASM General Meeting, Boston, MA, May 2014.
- **S. C. Popat**, R. A. Yoho, O. Ajulo, C. I. Torres. Electrochemical characterization reveals multiple distinct electron transport pathways in anode biofilms of *Geobacter sulfurreducens*. 225th Electrochemical Society Meeting, Orlando, FL, May 2014.
- **S. C. Popat**, D. Ki, B. E. Rittmann, C. I. Torres. On cathodic potential losses in microbial fuel cells. North American International Society for Microbial Electrochemistry and Technology meeting, Ithaca, NY, October 2012.
- **S. C. Popat**. Understanding and overcoming potential losses in microbial fuel cells for practical application in wastewater treatment. AZ Water Annual Conference & Exhibition, Glendale, AZ, May 2012.

- B. G. Lusk, **S. C. Popat**, P. Parameswaran, B. E. Rittmann, C. I. Torres. Characterization of the thermophilic anode-respiring *Thermincola ferriacetica*. ACS Annual Spring Meeting, Anaheim, CA, March 2011.
- **S. C. Popat**, K. Zhao, M. A. Deshusses. Advances in treatment of trichloroethene-laden waste gases in anaerobic biotrickling filters containing *Dehalococcoides* spp. Duke-UAM Conference on Biofiltration for Air Pollution Control, Washington, DC, October 2010.
- **S. C. Popat**, M. A. Deshusses. Anaerobic biotrickling filter trichloroethene removal from waste gases. Air & Waste Management Association's Annual Conference and Exhibition, Detroit, MI, June 2009.
- **S. C. Popat**, M. A. Deshusses. Trichloroethene removal in an anaerobic biotrickling filter. USC-UAM Conference on Biofiltration for Air Pollution Control, Long Beach, CA, October 2008.
- **S. C. Popat**, O. J. Prado, J. Lafuente, D. Grabiell, M. A. Deshusses. Packings for biotrickling filters: do surface properties matter? USC-UAM Conference on Biofiltration for Air Pollution Control, Long Beach, CA, October 2008.

INVITED SEMINARS

- A tale of two efficiencies: Improving the performance of microbial electrochemical cells for energy recovery from wastewater treatment. Department of Environmental Engineering and Earth Science, Clemson University, April 2016.
- A tale of two efficiencies: Improving the performance of microbial electrochemical cells for energy recovery from wastewater treatment. Department of Civil and Environmental Engineering, University of California, Davis, March 2016.
- How to make a memorable presentation? Molecular and Cellular Biology seminar, Arizona State University, April 2013.
- Environmental biotechnology: applications in remediation and energy. Department of Chemical, Biochemical and Environmental Engineering, University of Maryland, Baltimore County, February 2011.

PATENTS

1. **S. C. Popat**, P. Parameswaran, B. E. Rittmann, C. I. Torres. Microbial electrolysis cells and methods for production of chemical products. U.S. patent #9216919, issued 12/22/2015.

RESEARCH FUNDING

AT CLEMSON UNIVERSITY

Total funding: \$761,100 (\$198,421 cost share)

S. C. Popat's share: \$398,284 (\$85,605 cost share)

Role	Other PIs	Project	Sponsor	Duration	Amount
Co-PI (50%)	Schlautman (PI)	Assessing engineering and management options in poultry processing and rendering plants to minimize interferences of quaternary ammonium compounds in wastewater treatment	South Carolina Department of Agriculture ACRE CGP	2018-2019	\$50,000
PI	N/A	Testing of a liter-scale microbial fuel cell with peroxide production for rendering wastewater treatment	Fats and Proteins Research Foundation via ACREC	2018-2019	\$38,500
PI	N/A	Microbial peroxide-producing cells for blackwater and greywater treatment during space missions	SC Space Grant Consortium	2018-2019	\$40,000 (\$20,000 cost share)
PI	N/A	Palmetto Academy: Microbial peroxide-producing cells for blackwater treatment during space missions	SC Space Grant Consortium	2018	\$36,000 (\$18,000 cost share)
Co-PI (25%)	Husson (PI), Ladner, Amy, Andersen, Berge, Norman, Furrer	Anaerobic membrane bioreactors as a next-generation technology to address the food-energy-water nexus	SC EPSCoR/ IDeA	2018-2020	\$450,421 (\$150,421 cost share)
PI	Ladner, Amy, Husson	Anaerobic membrane bioreactors for wastewater treatment: Enhanced performance through novel process improvements and low-fouling membranes	CU Division of Research	2017-2019	\$65,138
PI	N/A	Microbial fuel cells with peroxide production for	SC Space Grant Consortium	2017-2018	\$20,000 (\$10,000 cost share)

		space life support systems applications			
PI	N/A	Treatment of rendering wastewater in microbial fuel cells with nitrogen recovery and peroxide production	Fats and Proteins Research Foundation via ACREC	2017-2018	\$38,498
PI	N/A	Development of substrate loaded microbial fuel cells for powering remote sensors	Office of Naval Research via Arizona State University	2017-2018	\$22,543

AT ARIZONA STATE UNIVERSITY

Role	Other PIs	Project	Sponsor	Duration	Amount
Co-PI	Rittmann (PI), Lively	SusChEM: COLLABORATIVE RESEARCH: Engineering the hollow-fiber membrane biofilm reactor to convert syngas to valuable products	National Science Foundation	2016-2019	\$209,022
Co-PI	Torres (PI), Krajmalnik-Brown	Combining electrochemical, -omics, and microscopic approaches to characterize transport limitations in anode-respiring bacteria biofilms	Office of Naval Research	2015-2018	\$449,000
Co-PI	Torres (PI)	Development of substrate loaded microbial fuel cells for powering remote sensors	Office of Naval Research	2015-2018	\$399,775
Co-PI	Redding (PI), Jones	Using heliobacteria to produce hydrogen using light in a microbial photo-electrosynthesis cell	ASU LightWorks	2014-2016	\$85,000

Co-PI	Torres (PI), Rittmann, Renaut	Characterizing electron transport resistances from anode-respiring bacteria using electrochemical techniques	Office of Naval Research	2012-2015	\$446,000
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STUDENT ADVISING

POSTDOCTORAL RESEARCH ASSOCIATES

- Negin Kananizadeh, 2017-now

GRADUATE STUDENTS

- Mehul Soni, M.S. student, Environmental Engineering & Science, 2016-2018
- Ao Xie, Ph.D. student, Environmental Engineering & Science, 2016-now
- Jessica Deaver, Ph.D. student, Environmental Engineering & Science, 2017-now
- Paige Taber, M.S. student, Environmental Engineering & Science, 2017-now
- Emily Murawski, M.S. student, Environmental Engineering & Science, 2017-now
- Emily Blair, M.S. student, Environmental Engineering & Science, 2018-now
- Spencer Lindsay, M.S., Environmental Engineering & Science, 2018-now

UNDERGRADUATE STUDENTS

- Salley Reamer, B.S. student, Environmental Engineering, 2016-2017
- Emily Blair, B.S. student, Environmental Engineering, 2016-2017
- Clancy Kerr, B.S. student, Microbiology, 2018-now
- Raven Althouse, B.S. student, Earth and Environmental Sciences (Furman), 2018-now
- Nicholas Mitchell, B.S. student, Geology (USC), 2018-now

STUDENT THESIS COMMITTEES

AT CLEMSON UNIVERSITY

- Matthew Vawter, M.S., Environmental Engineering & Science, 2017
- Weiming Qi, M.S., Environmental Engineering & Science, ongoing
- Kameryn Mcgee, M.S., Environmental Engineering & Science, ongoing
- Joel Neuder, Environmental Engineering & Science, ongoing
- Sheikh Moni, Ph.D., Environmental Engineering & Science, ongoing
- Roksana Mahmud, Ph.D., Environmental Engineering & Science, ongoing
- Hamed Torkzadeh, Ph.D., Environmental Engineering & Science, ongoing
- Colby Cash, Ph.D., Environmental Engineering & Science, ongoing

AT ARIZONA STATE UNIVERSITY

- Rachel Yoho, Ph.D., Biological Design, 2016
- Dongwon Ki, Ph.D., Environmental Engineering, 2016
- Karthik Ravishankar, M.S., Chemical Engineering, 2016
- Julia Thompson, B.S. Honors, Chemical Engineering, 2016
- Nadratan Chowdhury, B.S. Honors, Chemical Engineering, 2016
- Ornella Sosa Hernández, Ph.D., Engineering Science (Tech de Monterrey, Mexico), 2015
- Devyn Fajardo-Williams, M.S., Environmental Engineering, 2015
- Ramoni Oluwo, M.S. Chemical Engineering, 2015
- Sean Tropsa, M.S. Chemical Engineering, 2015
- Aakash Sadaria, M.S., Environmental Engineering, 2015
- Mikaela Stadie, B.S. Honors, Chemical Engineering, 2015
- Sean Tropsa, B.S. Honors, Chemical Engineering, 2014
- Oluyomi Ajulo, M.S., Chemical Engineering, 2013

PROFESSIONAL MEMBERSHIPS

- Association of Environmental Engineering & Sciences Professors
- International Society for Microbial Electrochemistry and Technology

PROFESSIONAL SERVICE

- *Ad hoc* reviewer for journals:
 - *AIChE Journal*
 - *Applied Biochemistry and Biotechnology*
 - *Applied and Environmental Microbiology*
 - *Analyst*
 - *Biodegradation*
 - *Bioelectrochemistry*
 - *Bioprocess and Biosystems Engineering*
 - *Bioresource Technology*
 - *Biotechnology and Bioengineering*
 - *Chemical Engineering Journal*
 - *ChemSusChem*
 - *Electrochimica Acta*
 - *Energy & Environmental Science*
 - *Environmental Engineering Science*
 - *Environmental Science: Processes and Impacts*
 - *Environmental Science: Water Research & Technology*
 - *Environmental Science & Technology*
 - *International Journal of Hydrogen Energy*
 - *Journal of Power Sources*

- *PLOS One*
- *Proceedings of the National Academy of Sciences U.S.A.*
- *RSC Advances*
- *Water Environment Research*
- *Water Research*
- *Water Science & Technology*
- *Ad hoc* proposal reviewer for
 - National Science Foundation
 - Department of Energy
- Reviewer for AEESP SSC Navigating the Academic and Professional Job Search workshop
- Member of the newsletter committee of International Society for Microbial Electrochemistry and Technology, 2013-present
- Member of technical advisory board for the start-up company, Arbsource, LLC, 2012-2015