

## **César I. Torres**

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### **Education**

**Ph.D. in Civil, Environmental and Sustainable Engineering**, Arizona State University, Tempe, AZ 2009

**M.S. in Civil and Environmental Engineering**, Northwestern University, Evanston, IL 2005

**B.S. in Chemical Engineering**, University of Puerto Rico, Mayagüez, PR 2002

### **Work & Research Experience**

**Associate Professor**, Arizona State University, Tempe AZ (August 2016 – present)  
School for Engineering of Matter, Transport, and Energy. Chemical Engineering Program.  
Graduate Faculty in Environmental Engineering, Cellular and Molecular Biology, and Biological Design programs.

**Assistant Professor**, Arizona State University, Tempe AZ (August 2010 – July 2016)  
School for Engineering of Matter, Transport, and Energy. Chemical Engineering Program.

**Postdoctoral Researcher**, Arizona State University; Tempe AZ (May 2009-August 2010)  
Advisor: Professor Bruce E. Rittmann “Characterizing the microbial ecology of anode-respiring bacteria selected based on anode potential”

**Research Assistant**, Arizona State University; Tempe AZ (2005-2009)  
Advisor: Professor Bruce E. Rittmann, “Microbial kinetics of anode-respiring bacteria”

**Research Assistant**, Northwestern University; Evanston IL (2002-2005)  
Advisor: Professor Bruce E. Rittmann, “Total nitrogen removal using hollow fiber membrane biofilm reactors”

**Engineer**, Co-op, Merck Sharp & Dohme; Barceloneta, PR (2000)  
Supervisor: Carlos Díaz

### **Awards**

2017 ISMET Best Technological Innovation Award

2016 ASU Fulton Faculty Exemplar Award

2013 ISMET Discovery Award for Best Scientific Paper (Popat et al. 2012)

2012 Achievement Award from Arizona Technology Enterprises on advising Arbsource

2012 Society of Hispanic Professional Engineers (SHPE) Young Investigator Award

2003 National Science Foundation Graduate Research Fellowship

2002 Northwestern University Walter P. Murphy Fellowship

2002 Luis C. Monzón Chemical Engineering Excellence Award

## Discoveries and Patents

Flory J, Fromme P, Vermaas W, Rittmann BE, Torres CI, Moore T, Moore A. “Microbial Electro-photosynthesis”. U.S. Patent Application 14/972,977; filed 12/2015.

Parameswaran P, Torres CI, Rittmann BE, Popat SC, Krajmalnik-Brown R. “Membrane biofilm reactors, systems, and methods for producing organic products”. U. S. provisional patent application #61/951,190; filed 03/2014.

Krajmalnik-Brown R, Torres CI, Delgado AG, Popat SC, Fajardo-Williams D. “Methods, system, and culture medium for production of dechlorinating microorganisms”. PCT application #14/204,058; filed 03/2013.

Popat SC, Parameswaran P, Rittmann BE, Torres CI. “Microbial electrolysis cells and methods for production of chemical products”. U. S. patent No. 9,216,919.

Popat SC, Parameswaran P, Torres CI, Rittmann BE. “Scalable modular design for microbial electrolysis cells”. Provisional Patent Application filed 03/2012.

Popat SC, Ki D, Rittmann BE, Torres CI. “Methods and systems for microbial fuel cells with improved cathodes”. Provisional Patent Application filed 02/2012.

Rittmann BE, Lee HS, Torres CI. “Microbial electrolytic cell”. US Patent Application No. 13/259,523 filed 09/2011.

Rittmann BE, Torres CI, Lee HS. “Bicarbonate and carbonate as hydroxide carriers in a biological fuel cell”. U.S. Patent No. 9,142,852.

Rittmann BE, Torres CI, Cowman J. “Methods for total nitrogen removal from waste streams”. U.S. Patent No. 7,491,331 (February 2009), Mexican Patent No. 268620 (07/2009).

Rittmann BE, Nerenberg R, Torres CI. “Apparatus for water treatment”. U.S. Patent No. 7,338,597 (03/2008).

## Peer-Reviewed Publications

Authors are highlighted in the following manner:

(\*) Corresponding author

ASU graduate students advised by me are ***bold and italicized***

Other ASU graduate students *in italics*

(#) ASU postdoctoral researchers or research scientists affiliated with my group.

## Book Chapters Published

2. ***Yoho RA***, Popat SC<sup>#</sup>, Fabregat-Santiago F, Giménez S, ter Heijne A, Torres CI\*. 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; in press.
1. Rittmann BE\*, Torres CI, Marcus AK. 2008. Perspectives on microbial fuel cells and other biomass-based renewable energy technologies. *Emerging Environmental Technologies*, V. Shah ed., Springer ISBN: 978-1-4020-8785-1.

## **Journal Publications**

61. **Lusk BG**, *Peraza I*, Albal G, Marcus AK, Popat SC, Torres CI. 2018. pH Dependency in Anode Biofilms of *Thermincola ferriacetica* Suggests a Proton-Dependent Electrochemical Response. Journal of the American Chemical Society in press.
60. Tejedor-Sanz S, Fernández-Labrador P, **Hart SG**, Torres CI, Esteve-Nuñez A\*. 2018. *Geobacter* dominates the inner layers of a stratified biofilm on a fluidized anode during brewery wastewater treatment. Frontiers in Microbiology 9: 378.
59. **Lusk BG\***, Colin A, Parameswaran P, Rittmann BE, Torres CI. 2018. Simultaneous fermentation of cellulose and current production with an enriched mixed culture of thermophilic bacteria in a microbial electrolysis cell. Microbial Biotechnology 11(1): 63-73.
58. **Esquivel-Elizondo S**, **Miceli III JF**, Torres CI, Krajmalnik-Brown R\*. 2018. Impact of carbon monoxide partial pressures on methanogenesis and medium chain fatty acids production during ethanol fermentation. Biotechnology and Bioengineering 115 (2), 341-350.
57. **Mahmoud M\***, Torres CI, Rittmann BE. 2017. Changes in glucose fermentation pathways as a response to the free ammonia concentration in microbial electrolysis cells. Environmental Science & Technology 51(22): 13461-13470.
56. Ki D<sup>#</sup>, Popat SC<sup>#</sup>, Rittmann BE, Torres CI\*. 2017. H<sub>2</sub>O<sub>2</sub> production in microbial electrochemical cells fed with primary sludge. Environmental Science & Technology 51: 6139-6145.
55. *Young MN*, *Chowdhury N*, Garver E, Evans PJ, Popat SC, Rittmann BE, Torres CI. 2017. Understanding the impact of operational conditions on performance of microbial peroxide producing cells. Journal of Power Sources, in press.
54. Zhou D, Dong S, She J, Cui X, Ki D, Torres CI, Rittmann BE. 2017. Intimate coupling of N-doped TiO<sub>2</sub> photocatalyst and anode respiring bacteria for enhancing 4-chlorophenol degradation and current generation. Chemical Engineering Journal, 317, 882-889.
53. Park Y, Park S, Nugyen VK, Yu J, Torres CI, Rittmann BE, Lee T\*. 2017. Complete nitrogen removal by simultaneous nitrification and denitrification in flat-panel air-cathode microbial fuel cells treating domestic wastewater. Chemical Engineering Journal, 316, 673-679.
52. **Mahmoud M\***, Parameswaran P, Torres CI, Rittmann BE. 2017. Electrochemical techniques reveal that total ammonium stress increases electron flow to anode respiration in mixed-species bacterial anode biofilms. Biotechnology and Bioengineering, in press.
51. **Ki D\***, Parameswaran P, Popat SC, Rittmann BE, Torres CI. 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.
50. *Young MN*, Stadie M, Popat SC<sup>#</sup>, Rittmann BE, Torres CI\*. 2016. Tailoring microbial electrochemical cells for production of hydrogen peroxide at high concentrations and efficiencies. ChemSusChem, 9 (23), 3345-3352.
49. **Miceli JF**, Torres CI, Krajmalnik-Brown R\*. 2016. Shifting the balance of fermentation products between hydrogen and volatile fatty acids: microbial community structure and function. FEMS Microbiology Ecology, 92 (12), fiw195.
48. **Lusk BG**, Parameswaran P, Popat SC, Rittmann BE, Torres CI\*. 2016. The effect of pH and buffer concentration on anode biofilms of *Thermincola ferriacetica*. Bioelectrochemistry, 112: 47-52.
47. Sosa-Hernández O, Parameswaran P, Alemán-Nava GS, Torres CI, Parra-Saldívar R\*. 2016. Evaluating biochemical methane production from brewer's spent yeast. Journal of Industrial Microbiology & Biotechnology, 6: 1-10.
46. Popat SC<sup>#</sup>, Torres CI. 2016\*. Critical transport rates that limit the performance of microbial electrochemistry technologies. Bioresource Technology, 215: 265-273.45.

### **Journal Publications (Cont.)**

45. **Mahmoud M**, Parameswaran P<sup>#</sup>, Torres CI, Rittmann BE\*. 2016. Relieving the fermentation inhibition enables high electron recovery from landfill leachate in a microbial electrolysis cell. RSC Advances, 6: 6658 – 6664.
44. Sosa-Hernández O, Popat SC<sup>#</sup>, Torres CI, Parameswaran P<sup>#</sup>, Alemán-Navaa GS, Buitrón G, Parra-Saldívar R\*. 2015. Application of Microbial Electrolysis Cells to Treat Spent Yeast from an Alcoholic Fermentation. Bioresource Technology, 200, 342-349.
43. **Ki, D**, Popat SC<sup>#</sup>, Torres CI\*. 2016. Reduced overpotentials in microbial electrolysis cells through improved design, operation, and electrochemical characterization. Chemical Engineering Journal, 287: 181-188.
42. **Lusk BG**, Khan QF, Parameswaran P<sup>#</sup>, Hameed A, Ali N, Rittmann BE, Torres CI\*. 2015. Characterization of electrical current-generation capabilities from thermophilic bacterium *Thermoanaerobacter pseudethanolicus* using xylose, glucose, cellobiose, or acetate with fixed anode potentials. Environmental Science & Technology, 49(24): 14725-14731.
41. **Yoho RA**, Popat SC, Rago L, Guisasola A, Torres CI. 2015. Anode biofilms of *Geoalkalibacter ferrihydriticus* exhibit electrochemical signatures of multiple electron transport pathways. Langmuir, 31: 12552-12559.
40. **Lusk BG**, Badalamenti J, Parameswaran P<sup>#</sup>, Bond DR, Torres CI. 2015. Draft Genome Sequence of the Gram-Positive Thermophilic Iron Reducer *Thermincola ferriacetica* Strain Z-0001<sup>T</sup>. Genome Announcements 3(5): e01072-15.
39. **Ki D**, Parameswaran P<sup>#</sup>, Popat SC<sup>#</sup>, Rittmann BE, Torres CI. 2015. Effects of pre-fermentation and pulsed-electric-field treatment of primary sludge in microbial electrochemical cells. Bioresource Technology, 195: 83-88.
38. **Ki D**, Parameswaran P<sup>#</sup>, Rittmann BE, Torres CI. 2015. Effect of pulsed electric field (PEF) pretreatment on primary sludge for enhanced bioavailability and energy capture. Environmental Engineering Science, 32(10): 831-837.
37. Badalamenti JP, Krajmalnik-Brown R, Torres CI, Bond DR\*. 2015. Genomes of *Geoalkalibacter ferrihydriticus* Z-0531<sup>T</sup> and *Geoalkalibacter subterraneus* Red1<sup>T</sup>, Two Haloalkaliphilic Metal-Reducing Deltaproteobacteria. Genome Announcements 3(2): e00039-15.
36. **Yoho RA**, Popat SC<sup>#</sup>, Torres CI\*. 2014. Dynamic potential-dependent electron transport pathway shifts in anode biofilms of *Geobacter sulfurreducens*. ChemSusChem 7(12): 3413-3419.
35. Popat SC<sup>#</sup>, **Ki D**, Young MN, Rittmann BE, Torres CI\*. 2014. Buffer pKa and transport govern concentration overpotential in electrochemical oxygen reduction at neutral pH. ChemElectroChem SI 1(11): 1909-1915.
34. **Miceli JF**, Garcia-Peña I, Parameswaran P<sup>#</sup>, Torres CI\*, Krajmalnik-Brown R\*. 2014. Combining microbial cultures for the efficient production of electricity from butyrate in a microbial electrochemical cell. Bioresource Technology 169: 169-174.
33. **Ren H**, Torres CI, Parameswaran P<sup>#</sup>, Rittmann BE, Chae J\*. 2014. Improved current and power density with a micro-scale microbial fuel cell due to a small characteristic length. Biosensors and Bioelectronics 61: 587-592.
32. Torres CI\*. 2014. On the importance of identifying, characterizing, and predicting fundamental phenomena towards microbial electrochemistry applications. Current Opinion in Biotechnology 27: 107-114.
31. **Mahmoud M**, Parameswaran P<sup>#</sup>, Torres CI, Rittmann BE\*. 2014. Fermentation pre-treatment of landfill leachate for enhanced electron recovery in a microbial electrolysis cell. Bioresource Technology 151: 151-158.

### **Journal Publications (Cont.)**

30. Delgado AG\*, **Fajardo-Williams D**, Popat SC<sup>#</sup>, Torres CI, Krajmalnik-Brown R\*. 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.
29. **Badalamenti JP**, Torres CI, Krajmalnik-Brown R\*. 2014. Coupling dark metabolism to electricity generation using photosynthetic cocultures. Biotechnology and Bioengineering 111: 223-231.
28. Parameswaran P, **Bry T**, Popat SC<sup>#</sup>, **Lusk BG**, Rittmann BE, Torres CI\*. 2013. Kinetic, electrochemical, and microscopic characterization of the thermophilic, anode-respiring bacterium *Thermincola ferriacetica*. Environmental Science & Technology 47: 4934-4940.
27. **Badalamenti JP**, Krajmalnik-Brown R, Torres CI\*. 2013. Generation of high current densities by pure cultures of anode-respiring *Geoalkalibacter* spp. under alkaline and saline conditions in microbial electrochemical cells. mBio 4, e00144-13.
26. **Badalamenti JP**, Torres CI, Krajmalnik-Brown R\*. 2013. Light-responsive current generation by phototrophically enriched anode biofilms dominated by green sulfur bacteria. Biotechnology and Bioengineering 110: 1020-1027.
25. Parameswaran P, Torres CI, Kang D-W, Rittmann BE, Krajmalnik-Brown R\*. 2012. The role of homoacetogenic bacteria as efficient hydrogen scavengers in microbial electrochemical cells (MXCs). Water Science and Technology 65(1):1-6.
24. Mahendra S, Gedalanga P, Kotay SM, Torres CI, Butler CS, Goel R\*. 2012. Advancements in Molecular Techniques and Applications in Environmental Engineering. Water Environment Research 84(10): 814-844.
23. Bond DR, Strycharz-Glaven SM, Tender LM\*, Torres CI. 2012. On electron transport through *Geobacter* biofilms. ChemSusChem 5(6): SI 1099-1105.
22. **Miceli JF**, Parameswaran P, Kang D-W, Krajmalnik-Brown R\*, Torres CI\*. 2012. Enrichment and analysis of anode-respiring bacteria from diverse anaerobic inocula. Environmental Science & Technology 46(18): 10349-10355.
21. Popat SC<sup>#</sup>, **Ki D**, Rittmann BE, Torres CI\*. 2012. Importance of OH<sup>-</sup> transport from cathodes in microbial fuel cells. ChemSusChem 5(6): SI 1071-1079.
20. **Choi S**, Lee HS, Yang Y, Parameswaran P, Torres CI, Rittmann BE, Chae J\*. 2011. A  $\mu$ L-scale micromachined microbial fuel cell having high power density. Lab on a Chip 11(6):1110-1117.
19. Goel R, Kotay SM, Butler CS, Torres CI, Mahendra S\*. 2011. Molecular biological methods in environmental engineering. Water Environment Research 83(10): 927-955.
18. Parameswaran P, Torres CI, Lee HS, Rittmann BE, Krajmalnik-Brown R\*. 2011. Hydrogen consumption in microbial electrochemical systems (MXCs): The role of homo-acetogenic bacteria. Bioresource Technology 102(1): 263-271.
17. Marcus AK\*, Torres CI, Rittmann BE. 2011. Analysis of a microbial electrochemical cell using the proton condition in biofilm (PCBIOFILM) model. Bioresource Technology 102(1):253-262.
16. Torres CI, Ramakrishna S, Chiu CA, Nelson KG, Westerhoff P, Krajmalnik-Brown R\*. 2011. Fate of sucralose during wastewater treatment. Environmental Engineering Science 28: 325-331.
15. Torres CI\*, Marcus AK, Lee HS, Parameswaran P, Krajmalnik-Brown R, Rittmann BE. 2010. A kinetic perspective on extracellular electron transfer by anode-respiring bacteria. FEMS Microbiology Reviews 34(1): 3-17.

### **Journal Publications (Cont.)**

14. Marcus AK\*, Torres CI, Rittmann BE. 2010. Evaluating the impacts of migration in microbial electrochemical cells using the model PCBIOFILM. Electrochimica Acta 55(23): 6964-6972.
13. Parameswaran P, Zhang H, Torres CI, Rittmann BE, Krajmalnik-Brown R\*. 2010. Microbial community structure in a biofilm anode fed with a fermentable substrate: The significance of hydrogen scavengers. Biotechnology and Bioengineering 105(1): 69-78.
12. Torres CI\*, Krajmalnik-Brown R, Parameswaran P, Marcus AK, Wanger G, Gorby Y, Rittmann BE. 2009. Selecting anode-respiring bacteria based on anode potential: phylogenetic, electrochemical, and microscopic characterization Environmental Science & Technology 43(24): 9519-9524.
11. Lee HS\*, Torres CI, Parameswaran P, Rittmann BE. 2009. Fate of H<sub>2</sub> in an upflow single-chamber microbial electrolysis cell using a metal-catalyst-free cathode. Environmental Science & Technology 43(20): 7971-7976.
10. Lee HS\*, Torres CI, Parameswaran P, Rittmann BE. 2009. Effects of substrate diffusion and anode potential on kinetic parameters for anode-respiring bacteria. Environmental Science & Technology 43(19): 7571-7577.
9. Parameswaran P\*, Torres CI, Lee HS, Krajmalnik-Brown R, Rittmann BE. 2009. Syntrophic interactions between anode-respiring bacteria (ARB) and non-ARB in a biofilm anode: electron balances. Biotechnology and Bioengineering 103(3): 513-523.
8. Lee HS\*, Parameswaran P, Marcus AK, Torres CI, Rittmann BE. 2008. Evaluation of energy-conversion efficiency in microbial fuel cells (MFCs) for fermentable and non-fermentable substrates. Water Research 42(6-7): 1501-1510.
7. Torres CI\*, Lee HS, Rittmann BE. 2008. Carbonate species as OH<sup>-</sup> carriers for decreasing the pH gradient between cathode and anode in biofuel-cells. Environmental Science & Technology 42(23): 8773-8777.
6. Torres CI\*, Marcus AK, Parameswaran P, Rittmann BE. 2008. Kinetic experiments for evaluating the Nernst-Monod model for anode-respiring bacteria (ARB) in a biofilm anode. Environmental Science & Technology 42(17): 6593-6597.
5. Torres CI\*, Marcus AK, Rittmann BE. 2008. Proton transport inside the biofilm limits electrical current generation by anode-respiring bacteria. Biotechnology and Bioengineering 100: 872-881.
4. Marsolek MD\*, Torres CI, Hausner M, Rittmann BE. 2008. Intimate coupling of photocatalysis and biodegradation in a photocatalytic circulating-bed biofilm reactor. Biotechnology and Bioengineering 101(1): 83-92.
3. Torres CI\*, Marcus AK, Rittmann BE. 2007. Kinetics of consumption of fermentation products by anode-respiring bacteria. Applied Microbiology and Biotechnology 77: 689-697.
2. Marcus AK\*, Torres CI, Rittmann BE. 2007. Conduction-based modeling of the biofilm anode of a microbial fuel cell. Biotechnology and Bioengineering 98(6): 1171-1182.
1. Cowman J, Torres CI, Rittmann BE\*. 2005. Total nitrogen removal in an aerobic/anoxic membrane biofilm reactor system. Water Science and Technology 52 (7): 115-120.

## **Recent Conferences and Presentations**

The list of authors in presentations follows the same format as the peer-reviewed publications, except (\*) is the main presenter.

### **Invited Presentations by CI Torres**

Torres CI\*, **Lusk BG, Yoho RA**, Popat SC. 2016. “The link between electron and proton transport in anode-respiring bacteria biofilms”. North-America ISMET Conference, Stanford University, October 2016.

Torres CI\*. “Ionic transport in microbial fuel cells and its importance in design optimization”. Congreso Nacional de Biotecnología, Guadalajara, México, Jun 2015.

Torres CI\*. “Ionic transport and its importance in microbial electrochemical cell design”. Department of Civil & Environmental Engineering Seminar, University of Illinois, Urbana-Champaign, Urbana, IL, Mar 2015.

**Ki D, Lusk BG, Miceli JF**, Colin A, Parameswaran P<sup>#</sup>, Popat SC<sup>#</sup>, Krajmalnik-Brown R, Torres CI\*. “Microbial hydrolysis and its role in microbial electrochemistry applications”. European ISMET Conference, Alcalá de Henares, Spain, Sep 2014.

Torres CI\*. “The importance of ionic transport in designing large-scale microbial electrochemical cells”. Environmental Science and Engineering Division Seminar Series at KAUST, Thuwal, Saudi Arabia, Aug 2014.

Torres CI\*. “Thermodynamics of electron transfer by anode-respiring bacteria”. Gordon Research Conference on Aqueous Corrosion, New London NH, Jul 2014.

Torres CI\*. “Electron and ionic transport in microbial anode respiration: fundamental knowledge that leads to applications in microbial electrochemical cells”. Plenary Speaker at North American ISMET Conference, State College PA, May 2014.

Torres CI\*. “Electron and ionic transport in microbial anode respiration: fundamental knowledge that leads to applications in microbial electrochemical cells”. Biotechnology Institute Seminar, University of Minnesota, Minneapolis MN, Feb 2014.

Torres CI\*. “Exploiting the concepts of microbial electrochemistry for wastewater treatment”. Society for Hispanic Professional Engineers (SHPE) Annual Conference, Fort Worth TX, Nov 2012.

Popat SC<sup>#</sup>, **Ki D**, Rittmann BE, Torres CI\*. “Overcoming ionic transport limitations in microbial electrochemical cells”. European ISMET Conference, Ghent, Belgium, Sep 2012.

Popat SC<sup>#</sup>, **Ki D**, Rittmann BE, Torres CI\*. “Cathodic transport limitations in microbial electrochemical cells”. 1st Microbial Fuel Cell Symposium at GIST, Gwangju, Korea, Jun 2012.

Torres CI\*. “Understanding transport limitations in anode respiration to achieve efficient electricity production from organic wastes”. Environmental Engineering Seminar at University of New Mexico, Albuquerque NM, Mar 2012.

Torres CI\*. “Kinetics and potentials in BES: Reporting electrode potentials”. Bioelectrochemical Systems Workshop, Penn State, College Park PA, Sep 2011.

Torres CI\*, Krajmalnik-Brown R. “Microbial electrochemical cells: Fundamentals, kinetics and their applications in biotechnology research and development”. Chevron Corp., San Ramon CA, Sep 2011.

### **Invited Presentations by CI Torres (cont.)**

- Torres CI\*. “Microbial fuel cells (MFCs): Their current and future applications”. Defense Manufacturing Conference, Las Vegas NV, Dec 2010.
- Torres CI\*. “Anode-respiring bacteria: Electricity-producing microorganisms and their laboratory and bioenergy applications”. Civil & Environmental Engineering Seminar at UCLA, Los Angeles CA, Nov 2010.
- Torres CI\*. “Microbial electrochemical cells and their applications in the wastewater industry”. Workshop on Waste to Resource at the Water Environment Federation Technical Exhibition and Conference (WEFTEC), New Orleans LA, Oct 2010.

### **Presentations**

- Yoho RA\***, Rago L, Popat SC<sup>#</sup>, Guisasola A, Torres CI. “Alkaliphilic, anode-respiring *Geothalassobacter ferrihydriticus* exhibits complex pathways of extracellular electron transfer”. Arizona/Nevada American Society for Microbiology Meeting, Flagstaff AZ, Apr 2015.
- Popat SC<sup>#</sup>, Parameswaran P\*, Torres CI. “Electron and ionic transport in microbial anode respiration and their importance in microbial electrochemical cell applications”. Platform presentation at 226th Electrochemical Society Meeting, Cancun, Mexico, Oct 2014.
- Popat SC\*, **Yoho RA**, Rago L, Guisasola A, Torres CI. “Unraveling the optimization of energy metabolism in members of *Geobacteraceae* during extracellular respiration”. Young Investigator platform presentation at ASM General Meeting, Boston MA, May 2014.
- Fajardo-Williams D\**, Delgado AG, Torres CI, Krajmalnik-Brown R. “Coupling bioflocculation of *Dehalococcoides* to high-dechlorination rates”. Presentation at Batelle’s Ninth International Conference on Remediation of Chlorinated and Recalcitrant Compounds in Monterey CA, May 2014. Winner of Student Paper Competition.
- Miceli, JF\***, Krajmalnik-Brown R, Torres CI. “Improving the efficiency of MXCs by managing mixed microbial communities using high substrate loadings”. Poster presented at ASM General Meeting, Boston MA, May 2014. Received ASM Student Travel Award.
- Lusk BG\***, Parameswaran P<sup>#</sup>, Popat SC<sup>#</sup>, Torres CI. “Proton diffusion limitations in biofilms of the thermophilic anode-respiring *Thermincola ferriacetica*”. Poster presented at ASM General Meeting, Boston MA, May 2014.
- Yoho RA\***, Popat SC<sup>#</sup>, Torres CI. “Use of advanced electrochemical techniques to reveal electron transport pathways in anode-respiring biofilms”. Arizona/Nevada American Society for Microbiology Meeting, Las Vegas NV, Apr 2014.
- Ki D\***, Popat SC<sup>#</sup>, Parameswaran P<sup>#</sup>, Rittmann BE, Evans PJ, Torres CI. “Kinetic study of microbial hydrolysis and anode respiration in microbial electrochemical cells (MXCs) fed with primary sludge”. Poster presented at North American ISMET meeting, State College PA, May 2014.
- Miceli JF\***; Torres CI, Krajmalnik-Brown R. “Improving Coulombic recovery in fermentable substrate fed MECs by shifting the products of fermentation.” Platform Presentation at the North American ISMET meeting, State College PA, May 2014.
- Yoho RA\***, Popat SC<sup>#</sup>, Torres CI. “Advanced electrochemical characterization of *Geobacter sulfurreducens* to reveal electron transport pathways”. Poster Presentation at North American ISMET meeting, State College PA, May 2014.



## **Presentations (Cont.)**

- Lusk BG\***, Parameswaran P, Popat SC, Torres CI. “Proton diffusion limitations in thermophilic microbial electrochemical cells using *Thermincola ferriacetica* as an anode respiring bacterium”. Poster Presentation at North American ISMET Meeting, State College PA, May 2014.
- Popat SC\*<sup>#</sup>, **Yoho RA**, **Ajulo O**, Torres CI. “Electrochemical characterization reveals multiple distinct electron transport pathways in anode biofilms of *Geobacter sulfurreducens*”. Platform presentation at 225th Electrochemical Society Meeting, Orlando FL, May 2014.
- Badalamenti JP**, **Ajulo O**, Khan QF, Parameswaran P, Ali N, Hameed A, Krajmalnik-Brown R, Torres CI\*. “Characterization of newly-discovered anode-respiring bacteria” Platform Presentation at Microbial Fuel Cell Conference 4, Cairns Australia, Sep 2013.
- Torres CI\*, **Ajulo O**, **Yoho RA**, Popat SC<sup>#</sup>. “Electrochemical characterization reveals parallel electron-transport processes in *Geobacter sulfurreducens*”. Platform Presentation at International Society for Electrochemistry Conference, Queretaro Mexico, Sep 2013.
- Lusk BG\***, Parameswaran P, **Bry T**, Popat SC<sup>#</sup>, Rittmann BE, Torres CI. “Thermophilic bacteria in microbial electrochemical cells”. Poster Presentation at AEESP 50th Anniversary Conference, Golden CO, Jul 2013.
- Popat SC\*<sup>#</sup>, **Ajulo O**, **Yoho RA**, Torres CI. “Characterization of biofilms of *Geobacter sulfurreducens* using electrochemical impedance spectroscopy”. Poster Presentation at AEESP 50th Anniversary Conference, Golden CO, Jul 2013.
- Miceli JF\***, **Badalamenti JP**, **Ajulo O**, Torres CI, Krajmalnik-Brown R. *Geoalkalibacter*: Finding novel anode-respiring bacteria in microbial electrochemical cells using community analysis.” Poster Presentation at IWA Microbial Ecology and Water Engineering, Ann Arbor MI, Jul 2013. Awarded 1<sup>st</sup> place in poster competition.
- Parameswaran P, Torres CI, Rittmann BE. “Pulsed Electric Field (PEF) as a pre-treatment for enhanced electron recovery from waste activated sludge”. Platform Presentation at AEESP 50th Anniversary Conference, Golden CO, Jul 2013.
- Parameswaran P\*, Popat SC<sup>#</sup>, Delgado AG, Krajmalnik-Brown R, Torres CI. “Efficient conversion of sucrose to electric current in a microbial electrolysis cell (MEC) anode through homoacetogen-anode respiring bacteria (ARB) partnership”. Poster Presentation at ASM General Meeting, Denver CO, May 2013.
- Popat SC\*<sup>#</sup>, **Ki D**, Rittmann BE, Torres CI. “On cathodic potential losses in microbial fuel cells”. Platform Presentation at North American ISMET Meeting, Ithaca NY, Oct 2012.
- Popat SC<sup>#</sup>, Torres CI\*. “Characterizing anode potential losses in microbial fuel cells using electrochemical techniques” Platform Presentation at AIChE Annual Conference, Pittsburgh PA, Oct 2012.
- Popat SC\*<sup>#</sup>, **Ki D**, Rittmann BE, Torres CI. “On cathodic potential losses in microbial fuel cells”. Poster Presentation at Gordon Research Conference on Fuel Cells, Smithfield RI, Aug 2012.
- Parameswaran P\*, **Bry T**, Popat SC<sup>#</sup>, Rittmann BE, Torres CI. “Characterization of the thermophilic, anode respiring bacterium (ARB) *Thermincola ferriacetica* in the biofilm anode of a microbial electrolysis cell (MEC)”. Poster Presentation at ASM General Meeting, San Francisco CA, Jun 2012.

## **Presentations (Cont.)**

**Miceli JF\***, Garcia-Peña I, Parameswaran P, Torres CI, Krajmalnik-Brown R. “Combining microbial cultures for the production of electricity from butyrate in an MXC”. Platform Presentation at American Chemical Society General Meeting, San Diego CA, Mar 2012.

Torres CI\*, Parameswaran P#, Marcus AK, Krajmalnik-Brown R, Rittmann BE. “Microbial electrochemical cells and their bioenergy applications in the laboratory and for the wastewater industry”. Platform Presentation at Association of Environmental Engineering and Science Professors (AEESP) Education and Research Conference, Tampa FL, Jul 2011.

Krajmalnik-Brown R\*, **Miceli JF**, Torres CI. “Enrichment of novel anode-respiring bacteria from diverse environments”. Platform Presentation at Battelle International Symposium on Bioremediation and Sustainable Environmental Technologies, Reno NV, Jun 2011.

Parameswaran P\*, Torres CI, Rittmann BE, Krajmalnik-Brown R. “Effect of high concentration of ammonium N on biofilm anode fed with fermentable substrate” Platform Presentation at the 241st ACS National Meeting, Anaheim CA, Jun 2011.

**Lusk BG**, Popat SC\*#, Parameswaran P, Rittmann BE, Torres CI. “Characterization of the thermophilic anode-respiring *Thermincola ferriacetica*”. Platform Presentation at ACS Annual Spring Meeting, Anaheim CA, Mar 2011.

Torres CI\*, Parameswaran P, *Badalamenti JP*, **Bry T**, Krajmalnik-Brown R. “Microbial electrochemical cells as a tool to obtain microbial responses with high temporal resolution”, Platform Presentation at the International Microbial Fuel Cell Conference, Wageningen, Netherlands, Jun 2011.

Torres CI\*. “Microbial fuel cells (MFCs): Generating electricity, hydrogen and chemicals from wastewater”, Platform Presentation at AZ Water Annual Conference, Phoenix AZ, May 2011.

Torres CI\*, García-Peña EI, Krajmalnik-Brown R, Rittmann BE. “Microbial electrochemical cells as a research tool to probe microbial and biofilm kinetics”. Poster Presentation at IWA/WEF Biofilm Reactor Technology Conference, Portland OR, Aug 2010. Winner of 2<sup>nd</sup> place poster competition.

Parameswaran P\*, Torres CI, Kang D-W, Rittmann BE, Krajmalnik-Brown R. “The role of homo-acetogenic bacteria as efficient hydrogen scavengers in microbial electrochemical systems” Poster Presentation at IWA/WEF Biofilm Reactor Technology Conference, Portland OR, Aug 2010.

## **Students and Researchers Advised**

### **Awards from Students and Postdocs**

- 2016 Ethan Howley. Awarded a Fulton Dean's Scholarship at ASU
- 2015 Steven Hart. Awarded an NSF Graduate Research Fellowship
- 2015 Jeba Sania (high school student). ASU Innovator and Entrepreneur Award at the Arizona Science and Engineering Fair, 2015
- 2014 Devyn Fajardo-Williams et al. Winner of Student Paper Competition at the Ninth International Conference on Remediation of Chlorinated and Recalcitrant Compounds
- 2013 Rachel A. Yoho. Awarded an NSF Graduate Research Fellowship
- 2013 Steven Hart. Awarded a one-year Science Foundation Arizona Graduate Fellowship
- 2013 Joseph Miceli. Best poster award at the IWA Microbial Ecology and Water Engineering Conference
- 2013 Drishti Sinha (high school student). Awarded the Stockholm Junior Water Prize at the Arizona Science and Engineering Fair
- 2012 Sudeep C. Popat. Awarded Best Presentation, North American meeting of International Society for Microbial Electrochemistry and Technology (ISMET)
- 2012 Joseph Miceli. ASU Institute for Maximizing Student Development Fellowship
- 2009 Joseph Miceli. Awarded a two-year Science Foundation Arizona Graduate Fellowship
- 2009 Bradley Lusk. Awarded a two-year Science Foundation Arizona Graduate Fellowship

### **Students Graduated**

#### **Ph.D.**

**Mohamed Mahmoud**, Environmental Engineering (co-advised with Prof. Bruce E. Rittmann)  
Dissertation: "Towards Improving Electron Recovery and Coulombic Efficiency of Microbial Electrochemical Cells Fed with Fermentable Electron Donors" – Defense on October 2016.

**Joseph F. Miceli**, Biological Design (co-advised with Prof. Krajmalnik-Brown)  
Dissertation: "Building microbial communities and managing fermentation in microbial electrolysis cells" – Defense on June 2015.

**Bradley G. Lusk**, Biological Design  
Dissertation: "Thermophilic Microbial Electrochemical Cells" – Defense on November 2015.

**Rachel A. Yoho**, Biological Design  
Dissertation: "Energy and the Environment: Electrochemistry of Electron Transport Pathways in Anode-Respiring Bacteria and Energy Technology and Climate Change in Science Textbooks" – Defense on February 2016.

**Dongwon Ki**, Environmental Engineering  
Dissertation: "Anaerobic Conversion of Primary Sludge to Resources in Microbial Electrochemical Cells" – Defense on April 2016.

#### **M.S. Thesis**

**Ibrahim Halloum**, Chemical Engineering (2016)  
Thesis: "Microalgal Biofilms for Treatment of Domestic Wastewater and Resource Recovery"

**Oluyomi Ajulo**, Chemical Engineering (2014)  
Thesis: "Electrochemical characterization of anode-respiring *Geobacter sulfurreducens* and *Geoalkalibacter subterraneus*"

### M.S. applied project

**Sam Nandakumar**, Chemical Engineering, 2017

Project Title: "Performance of a flat-plate horizontal photobioreactor"

**Karthik Pushpavanam**, Chemical Engineering, 2015

Project Title: "Hemoglobin and Vitamin B-12 optimization as catalyst in fuel cells"

**Sean Tropsa**, Chemical Engineering, 2015

Project title: "Use of pyrolyzed vitamin B-12 as a catalyst in alkaline fuel cells"

**Hitesh Malik**, Chemical Engineering 2015

Project title: "Pyrolyzed hemoglobin as a catalyst for oxygen reduction reaction in fuel cells"

**Sharad K. Vellore Suresh**, Chemical Engineering 2015

Project Title: "Using advanced electrochemical tools to understand anaerobic microbial hydrolysis"

**John Pennington**, Chemical Engineering 2015

Project Title: "Electrochemical characterization of *Geoalkalibacter ferrihydriticus*"

**Tyson Bry**, Environmental Engineering 2013

Project Title: "Characterization of thermophilic anode bacterium *Thermincola ferriacetica*". Second author in publication 28.

**Abdul-Hakeem Hamdan**, Environmental Engineering 2012

### Current Ph.D. Students

**Steven Hart**, Environmental Engineering

**Ethan Howley**, Environmental Engineering

**Diana Calvo**, Environmental Engineering (co-advised with Dr. Bruce E. Rittmann)

**Megan Altizer**, Environmental Engineering (co-advised with Dr. Rosa Krajmalnik-Brown)

**Christine Lewis**, Biochemistry (co-advised with Dr. Petra Fromme)

### Current M.S. Student

**Francisco Brown-Muñoz**, Chemical Engineering

### Postdoctoral Researchers

Dongwon Ki, Postdoctoral Researcher (Jun 2016-present).

### Undergraduate Students Advised

Eric Thin, Chemical Engineering (2016)

Taylor Rumsey, Chemical Engineering, FURI awardee (2016)

Samuel Aguiar, Chemical Engineering, FURI Awardee (2016)

Francisco Brown-Muñoz, Swette Sustainability Intern (2015 – present)

Zixuan Wang, Chemical Engineering, FURI awardee (2015-2016)

Julia Thompson, Chemical Engineering (2014-2016)

Warren Scott Shearman, Chemical Engineering, FURI awardee (2014-2015)

Denton Holzer, Chemical Engineering, Swette Sustainability Intern (2015-2016)

Mikaela Stadie, Chemical Engineering, FURI awardee (2012-2015)

Sean Tropsa, Chemical Engineering (2013-2014), became an M.S. student in my group

Kassandra Nikkah, Chemical Engineering (2013)

Amy Umateriya, Environmental Engineering, Swette Sustainability Intern (2013)

Allison Snodgrass, Chemical Engineering, FURI awardee (2013-2014)  
Suyana Lozada, Chemical Engineering, FURI awardee (2011-2013)  
Devyn Fajardo-Williams, Chemical Engineering, FURI awardee (2011-2012)  
Nicole Nebitsi, Sustainability (2011-2012)

### **Visiting Ph.D. Students and Researchers**

Sara Tejedor, Ph.D. student from University of Alcalá, Spain, 2015  
Yanping Hou, Ph.D. student from Sun Yat-sen University, China, 2014  
Ornella Sosa Hernandez, Ph.D. student from Tecnológico de Monterrey, Mexico, 2013  
Laura Rago, Ph.D. student from Universitat Autònoma de Barcelona, Spain, 2013  
Qaiser Farid Khan, Ph.D. student from Quaid-i-Azam University, Pakistan, 2012-13, 2014  
Alexandra Colin, Ph.D. student from École Normale Supérieure, France, 2013  
Dr. Carmalin Sophie, Researcher from National Environmental Engineering Research Institute, India, 2011  
Dr. Venkata Yarlagadda, Researcher from Bhabha Atomic Research Centre, India, 2011

### **High School Student Advised**

Jeba Sania, SCENE Program (2014-present)  
Atreya Tadepalli, SCENE Program (2013-2014)  
Jean Juang, SCENE Program, Winner of the Stockholm Junior Water Prize (2012)  
Carlos Alvarado (2012)  
Jonah Rucker (2010-2012)  
Victor Silva (2013-present)  
Drishti Sinha, SCENE program student (2013)  
Tabarak Abdelhabib, Paragon Science Academy (2014-present)  
Beyza Celik, Paragon Science Academy (2014-present)

## **Summary of Professional Activities and Service**

### **Service at ASU**

- Interim Graduate Chair for the chemical engineering program (2017 – present).
- Fulton Undergraduate Research Initiative (FURI) faculty reviewer (2014-present).
- Chemical Engineering advisor for the Grand Challenges Scholar Program (2016).
- Member of committee to develop the Sustainable Energy Ph.D. program within the School of Sustainability (2015-2016).
- Member of the Chemical Engineering program graduate committee (2011-present).
- Faculty hiring committee in several searches within SEMTE (2012-2016).
- Graduate Faculty affiliate in Environmental Engineering, Sustainability, Cellular and Molecular Biology, and Biological Design programs.
- Advisor to AIChE's Chem-E Car team, an undergraduate student group that participates in an AIChE sponsored competition. 1<sup>st</sup> place winners of the regional West competition in 2012.
- Member of the new faculty cohort steering committee (2012-2014).
- Faculty Mentor for the new faculty cohort steering committee (2014-present).

### **Service outside ASU**

- Member of the ISMET Board of Directors and Editor of ISMET News (2016)
- Conference Chair for the International Society for Microbial Electrochemical Technologies (ISMET) Conference, held at ASU in October 1-4<sup>th</sup>, 2015 (<http://www.ismet2015.org>).
- Applied and Environmental Microbiology (AEM) Editorial Board (2015 -present)
- Session organizer for the “Microbial Fuel Cell” session at the American Chemical Society Conference (2011), and the Association of Environmental Engineering and Science Professors Conference (2013).
- Participated as facilitator on the Graduate Institute workshop on grant writing for the Society for Hispanic Professional Engineers (SHPE) Conference (2013).
- Member of the Scientific Committee for European ISMET Conference 2014.
- Member of the ISMET Board of Directors (2012-2013).
- Chair of the ISMET Membership Committee (2013-2014).
- Scientific Advisor to Arbsource LCC., an ASU-Venture Catalyst startup company focused on microbial electrochemical technologies (<http://arbsource.us/>)
- Reviewer for publications in ACS Catalysis, Applied and Environmental Microbiology, Biofuels, Bioresource Technology, Biotechnology and Bioengineering, Biotechnology Progress, ChemSusChem, Energy and Environmental Science, Environmental Engineering Science, Environmental Microbiology, Environmental Science & Technology, International Journal of Hydrogen Energy, Journal of Process Control, Process Biochemistry, Science, Trends in Biotechnology, Water South Africa, and Water Research.
- Reviewer for proposals for the National Science Foundation (2011-2014), the American Association for Advancements of Science (2014), the SÊR CYMRU National Research Network for Low Carbon, Energy and Environment (2014), and the Fondo Nacional de Desarrollo Científico y Tecnológico, Government of Chile (2013-2014).
- Member of the American Society for Microbiology (ASM), American Institute of Chemical Engineers (AIChE), International Society for Microbial Electrochemical Technologies (ISMET), and Association of Environmental Engineering and Science Professors (AEESP).