

Sophia Lauren Plata

Doctoral Research Assistant
Department of Civil & Environmental Engineering
University of Southern California
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Nationality: American, U.S. born citizen

Education

University of Southern California (USC)

Doctorate of Philosophy, Environmental Engineering

July 2015 - Present

Thesis Title: Water and energy in desalination: Novel technologies, configurations, and operational paradigms

Thesis Advisor: Amy Childress, Ph.D.

University of Southern California (USC)

Masters of Science, Environmental Engineering

Graduated: May 2017

Widener University

Bachelor of Science, Civil Engineering; Minor in Environmental Engineering

Graduated: May 2015

Research Methods and Interests

Experimental and Modeling Desalination: My research focuses on membrane processes as a means to overcome contaminant and energy challenges in water treatment. My work began with a focus on an osmotically driven membrane process known as pressure-retarded osmosis, which is a means of capturing salinity gradient energy. This work has the potential to reduce energy consumption and the environmental impacts associated with seawater desalination. More recently, my work has focused on the chemical speciation and kinetics of disinfecting a blended reclaimed water and seawater stream. The goal of which is to provide a reliable supply of water for potable reuse applications while limiting the amount of disinfectant byproducts formed.

Academic: My academic aspirations are to bring higher education access to underrepresented communities as an educator at an institution of higher education that highly values teaching. My pedagogy involves the use of diverse pedagogical approaches to welcome underrepresented communities and optimize critical thinking for all students. Drawing on my Hispanic heritage, I employ story-telling to make STEM-based material more accessible for broad audiences and use inquiry-based teaching to foster an environment where students are encouraged to ask questions and continually build their self-efficacy in STEM regardless of background.

Skills

Programming Languages: LaTeX, MATLAB

Engineering Software: LabVIEW, AutoCAD, ROSA, WAVE, Biowin, Visual Minteq, Kintecus

Spoken Languages: English (Fluent), Spanish (Conversational)

Research Activity

University of Southern California

Childress Research Group, Doctoral Advisor: Amy Childress, Ph.D.

Graduate Research Assistant, 07/2015-Present: My research focuses on an osmotically driven membrane process known as pressure-retarded osmosis (PRO), which is a means of capturing salinity gradient energy. This osmotic process, converts the chemical energy released from mixing a lower salinity solution (e.g., highly treated wastewater) and a higher salinity solution (e.g., desalination brine) into hydraulic energy. This hydraulic energy can then be used on-site at desalination facilities to reduce energy requirements. This research has the potential to reduce energy demands and environmental impact caused by desalination, all while recycling streams that would otherwise be wasted.

Widener University

Davis Group, Advisor: John Davis, Ph.D.

Research Assistant, 08/2014 - 12/2014: Focused on algal growth in Chester Creek in Chester, PA, due to nutrients produced by a local wastewater treatment plant located upstream.

Archived Publications

Peer-reviewed Published Papers

1. **Plata, SL** and AE Childress, "Limiting power density in pressure-retarded osmosis: Observation and implications" *Desalination*, 2019. **467**: p.51-56. DOI 10.1016/j.desal.2019.05.013
2. **Plata, SL**, I Hasbun, M Rodriguez, D Renaud, "Social-cognitive leadership theory of SHPE's premier leadership conference for undergraduates and professionals in the STEM workforce" 2020 CoNECD Conference Proceedings, 2020.
3. Zohrabian, A, **SL Plata**, AE Childress, KT Sanders, "A review on demand response opportunities in water supply and wastewater systems", *Renewable Energy* (Under Review)
4. **Plata, SL**, DL McCurry, AE Childress, "Seawater-augmented reuse: A study of upstream blending for potable reuse", *Environ Sci and Tech* (In Preparation)
5. Shi, JL, **SL Plata**, AE Childress, DL McCurry, "Formation and persistence of nitromethane in ozone-based water reuse processes", *Environ Sci and Tech* (In Preparation)

Published Abstracts, Posters, and Presentations

1. **Plata, SL**, DL McCurry, AE Childress, "Seawater-augmented reuse: A study of upstream blending for potable reuse applications", American Chemical Society Spring 2020 National Meeting, March 24, 2020, Philadelphia, PA. (accepted)
2. **Plata, SL** and A. E. Childress, "Synergistic Blending of Seawater and Wastewater for Direct Potable Reuse Applications", AMTA's 2020 Membrane Technology Conference and Exposition, March 17, 2020, Phoenix, AZ. (accepted)
3. Childress, AE, X Wei, Z Binger, **SL Plata**, KT Sanders, A Achilli, "Integrating Systems of Water Reuse and Desalination", 9th IWA Membrane Technology Conference and Exhibition of Water and Wastewater Treatment, June 24, 2019, Toulouse, France.
4. **Plata, SL** and A. E. Childress, "Identifying limiting flux behavior in pressure-retarded osmosis", AEEESP Research and Education Conference, May 15, 2019, Tempe, AZ.
5. **Plata, SL** and AE Childress, "Membrane mechanics and fouling behavior in pressure-retarded osmosis", AMTA's 2019 Membrane Technology Conference and Exposition, February 28, 2019, New Orleans, LA.
6. **Plata, SL** and AE Childress, "Pressure-retarded osmosis for energy recovery in desalination", USC CEE PhD Seminar Series, November, 2017, Los Angeles, CA.
7. Childress, AE, **SL Plata**, A Achilli, "Advanced Technologies for Sustainable Desalination", IWA 13th Leading Edge Conference on Water and Wastewater Treatment Technologies, June 13-16, 2016, Jerez de la Frontera, Spain.
8. **Plata, SL**, D Garbarino, E Smith, S Turely, and E Smith, "Determination of factors influencing waste composition at institutions of higher education, 30th Annual International Conference on Solid Waste Technology Management", March 15, 2015, Philadelphia, PA.

Organization Memberships

American Membrane Technology Association, student member, since 2015

American Society of Civil Engineers, student member, since 2011

Kappa Theta Epsilon, student member, since 2013

Society of Hispanic Professional Engineers (SHPE), graduate student member, since 2015

Society of Women Engineers (SWE), student member, since 2011

Tau Beta Pi Honor Society, member, 2014

Teaching Activity

Research Mentor

University of Southern California, Los Angeles, California

Undergraduate Mentorship, 06/2015 - Present

Student: Justine Lee ('18) *Current Position:* M.S. Student at Stanford

Student: Samantha McVety ('19) *Current Position:* Ph.D. Student at Stanford University

Student: Grace Yao ('19) *Current Position:* M.S. Student at Stanford University

Student: Cassandra Boyle ('19) *Current Position:* M.S. Student at USC

Student: Catherine Knox ('20) *Current Position:* B.S. Student at USC

Summer High School Intensive in Next-Generation Engineering, 06/2017 - Present

Student: Pearson Mewbourne *Project title:* Electrospun membranes yield pore results

Student: Ashley Shim *Project title:* Characterizing membrane distillation membranes under wetting/non-wetting conditions

Student: Elise Hou *Project title:* Renewable power generation through pressure-retarded osmosis

USC Young Researchers Program, 06/2018 - Present

Student: Laurence Trembley *Project title:* Testing the removal of nitromethane for applications in potable reuse

Student: Yenifer Hernandez *Project title:* Characterizing membranes with liquid entry pressure for membrane distillation

Teaching & Instruction

University of Southern California, Los Angeles, California

Viterbi School of Engineering

Mechanical Behavior of Materials Teaching Assistant, 08/2015 - 12/2018: Operated a universal testing machine to test the limits of various engineering materials. Advised and assisted students on final projects (e.g., advised on final project selection, supervised experiments on universal testing machine, and graded final projects). Substituted as lecturer. Trained seven teaching assistants.

Geotechnical Engineering Teaching Assistant, 01/2016 - 05/2020: Instructed students on how to conduct various geotechnical engineering labs to test the conditions of various soils. Trained six teaching assistants. Conducted review sessions. Graded engineering lab reports.

Widener University

College of Arts and Sciences

Mathematics Tutor, 01/2013 - 05/2015: Tutored local Title I high school students in math twice a week during open tutoring hours

School of Engineering

AutoCAD Teaching Assistant, 01/2013 - 05/2013: Assisted a professor in conducting a classroom of 30 first-year, civil engineering students twice a week

Service Activity

Internal Service

University of Southern California - Viterbi School of Engineering

1. Center for Engineering Diversity - talent development volunteer
2. Women in Science and Engineering - mentor for undergraduate engineering and science students

Invited Speaker for K-12 audiences, presented to a combined +600 third, fourth and fifth graders

1. S. L. Plata, Addressing Global Water Challenges: Desalination and Reuse, USC Viterbi's REACH Symposium February 2019, Los Angeles, CA.
2. S. L. Plata, Water Power!, Second Annual Viterbi Press Friends Symposium, February 2018, Los Angeles, CA.
3. S. L. Plata, One Water, First Annual Viterbi Press Friends Symposium, February 2017, Los Angeles, CA.
4. S. L. Plata, Quenching the Thirst: The Global Shift to Alternative Sources of Water, Educator Workshop hosted by USC, March 2016, Los Angeles, CA.

External Service

Society of Hispanic Professional Engineers (SHPE)

1. National Board of Directors Member, 07/2019 - 06/2020
2. Regional Graduate Representative, 07/2018 - 06/2019

Mexico Innova at USC Treasurer, 09/2018 - 12/2019

Financial Awards & Honors

National

1. National Science Foundation's ASSIST Travel Grant Recipient, 2017, 2018, 2019
2. Great Minds in STEM Early Faculty Symposium, 2017, 2018, 2019

Local

1. USC WiSE Leadership Award for Students and Postdoctoral Scholars, 2020
2. USC Civil Environmental Engineering Department's Outstanding Teaching Assistant Award, 2016 and 2018
3. USC Viterbi School of Engineering's Jenny Wang Excellence in Teaching Award, 2017 and 2018
4. USC University Outstanding Teaching Assistant Nominee, 2017
5. USC Civil Environmental Engineering Department, Featured Research Assistant, November 2016
6. USC Viterbi School of Engineering Ph.D. Fellowship, 2015
7. Widener University's Top Civil Engineer Award, 2015
8. Widener University's Dean's List, 2012-2015
9. Michael Baker Corporation's Scholarship for Diversity in Engineering, 2013
10. American Society of Highway Engineers' Delaware Valley Engineering Scholarship, 2013