

LEVI STRAKA, Ph.D.

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Research Interests

My research interests lie in the field of environmental biotechnology, specifically as applied for the recovery of energy or nutrients, generation of renewable bioenergy, and preservation of natural environments. I have specific expertise in kinetic mathematical modeling of microbial communities and microbial cultivation in bioreactors of ammonia oxidizing and phototrophic organisms.

Education

Ph.D. Environmental Engineering, Arizona State University (May, 2017)

Committee: Bruce E. Rittmann (Chair), César I. Torres, Peter Fox

Dissertation: *Light-Dependent Growth Kinetics and Mathematical Modeling of Synechocystis sp. PCC 6803*

M.S. Environmental Engineering, University of Wisconsin – Madison (August, 2009)

Committee: Dan Noguera (Chair), Greg Harrington, Dean Shiskowski (external member)

Thesis: *Photosynthetic Wastewater Treatment*

B.S. Civil/Environmental Engineering, University of Wisconsin – Madison (December, 2007)

Research Experience

Postdoctoral Research Associate, University of Washington Department of Civil and Environmental Engineering (2017-present)

Advisers: Mari Winkler and David Stahl

I participate in the microbiology, design of bioreactor and flow cell experiments, and modeling of microbial interactions influencing synthetic and natural granular sludge performance as part of a DAPRA funded grant.

PhD Research (2011-2017) I was a core member of the Photobioreactor team working towards the generation of photosynthetic fuels using *Synechocystis sp. PCC 6803*; My role was studying light-dependent growth kinetics and mathematical modeling.

Masters Research (2007-2009) I was investigating the potential for enhanced biological nutrient removal wastewater treatment using a photosynthetic activated sludge.

Undergraduate research (2007) I was investigating the potential for an electric field to remove ions from drinking water, otherwise called capacitive deionization.

Proficient use of the following analytical instruments:

Ion Chromatography

Total Organic Carbon Analyzer

Gas Chromatography

UV Spectrophotometer

High Performance Liquid Chromatography

Spectroradiometer

Variety of Bioreactors

Gallery™

Proficient use of the following software:

Microsoft Office (Word, Excel, Powerpoint)

Matlab

Industry Experience

Water Engineer (2009-2011) AECOM, Chicago, IL

Significant projects and roles:

- Post Award Services for Hydraulic Improvements at Calumet WRP: I assisted in the review of change order requests, shop drawing submittals, and requests for information from the contractor.
- Post Award Services for New Primary Treatment Facilities at Calumet WRP: I preformed similar roles to the Hydraulic Improvements project.
- District engineering services for the Bonnie Brae and Lockport Heights sanitary districts: I prepared construction documents for storm water sewer inflow improvements, and drinking water distribution maintenance
- Mokena WWTP Expansion: I prepared process design documents (drawings and specifications) for the plant expansion, including retrofitting biological nutrient removal to the aeration basins, adding an additional aerobic digester, and adding cloth filter tertiary treatment.

Engineering Trainee (2007) Metropolitan Water Reclamation District, Chicago, IL

I worked in plant design management, where we reviewed drawing submittals for wastewater treatment plant upgrades.

Engineering Intern (2005-2007) Wisconsin Solar Design, Madison, WI

I assisted in designing, building, and installing greenhouses, skylights, and solariums

Honors and Awards

ASU Dean's Fellowship Award (2011-2012)

Polkowski Fellowship (2008-2009)

Ira A Fulton Fellowship (2011-2012)

UW Dean's List, 10 semesters (2002-2007)

Lewis Hanford Kessler Memorial Scholarship (2009)

Academic Excellence Scholarship (2002-2006)

Teaching Experience

Research mentoring: 2 undergraduates and 1 high school student (2008-2009)

3 undergraduates (2015-2017) pre-graduate school volunteer (2017-present)

Civil Engineering 320: Intro to Environmental Engineering – Teaching Assistant (2007, 2 sections)

Math 222: Calculus and Analytical Geometry 2 - Student Assistant (2003, 1 section)

Teaching Interests

Introduction to Environmental Engineering

Biological Treatment Processes

Environmental Engineering Processes

Environmental Biotechnology

Wastewater Treatment Plant Design

Publications

Published Journal Articles:

- Straka L, Rittmann BE. 2017. Light attenuation changes with photo-acclimation in a culture of *Synechocystis* sp. PCC 6803. *Algal Res.* **21**, 223–226.
- Straka L, Rittmann BE. 2017. The Role of Heterotrophic Bacteria in Assessing Phosphorus Stress to *Synechocystis* sp. PCC6803. *J. Appl. Phycol.* **29**, 1877-1882
- Zhou Y, Nguyen B, Zhou C, Straka L, Lai Y, Xia S, Rittmann B. 2017. The distribution of phosphorus and its transformations during batch growth of *Synechocystis*. *Water Res.* **122**, 355-362
- Zhou Y, Lai Y, Eustance E, Straka L, Zhou C, Xia S, Rittmann BE. 2017. How myristyltrimethylammonium bromide enhances biomass harvesting and pigments extraction from *Synechocystis* sp. PCC 6803. *Water Res.* **126**,189–196.
- Straka L, Rittmann BE. 2017. Effect of Culture Density on Biomass Production and Light Utilization Efficiency of *Synechocystis* sp. PCC 6803. *Biotechnol. Bioeng.* Accepted. DOI 10.1002/bit.26479

Journal Articles in Submission:

- Straka L, Rittmann BE. Light-Dependent Kinetic Model for Microalgae Experiencing Photo-Acclimation, Photo-Damage, and Photo-Damage Repair.
- Straka L, Rittmann BE. Dynamic Response of *Synechocystis* sp. PCC 6803 to Changes in Light Intensity.
- Zhou Y, Eustance E, Straka L, Lai Y, Xia S, Rittmann BE. Quantification of heterotrophic bacteria during the growth of *Synechocystis* sp. PCC 6803 using fluorescence activated cell sorting and microscopy.

Journal Articles in Preparation:

- Straka L, Rittmann BE. Growth Kinetics and Mathematical Modeling of *Synechocystis* sp. PCC 6803 Under Flashing Light.
- Cahill B, Straka L, Maldonado Ortiz J, Krajmalnik-Brown R, Rittmann BE. Light Intensity Effects on Soluble Microbial Products produced by *Synechocystis* sp. PCC 6803 and the Heterotrophic Community.

Poster Presentations

- Straka L, Rittmann BE. Growth Kinetics and Mathematical Modeling of *Synechocystis* sp. PCC 6803 Under Flashing Light. AEESP Research and Education Conference. 2017, June 22, Ann Arbor, MI.
- Straka L, Rittmann BE. Light-Dependent Mathematical Growth Modeling Accounting for Photo-Acclimation and Photo-Damage. Algae Biomass Summit. 2016, October 23-26, Glendale, AZ.
- Straka L, Rittmann BE. Reducing Soluble Organics in a Cyanobacterial Culture for the Control of Heterotrophic Bacteria. Second Annual SSEBE Graduate Research Symposium. 2013, March 15, Tempe, AZ.

Grants

Straka L. (not granted, 2015). Light-Limited Growth Mathematical Modeling of Microalgae. Fulbright Research Grant.

Laureanti J, Straka L, Jones A, Rittmann BE, Redding K. (2015). Phototrophic production of 3-hydroxypropionate by Genetically Modified *Synechocystis* sp. PCC 6803. IGERT SUN Competitive Innovation Fund

Professional Development

Preparing Future Faculty program, Arizona State University, 2014-2015

NSF Integrative Graduate Education and Research Traineeship: Solar Utilization Network fellowship; includes classes, site visits, and seminars related to all aspects of solar energy; Arizona State University, 2012-2014

Microalgae Process Design Workshop, Wageningen UR, The Netherlands, 2013

Professional Service

Manuscript Reviewer (3 papers reviewed) for *Water Research*, *Water, Air, & Soil Pollution*, and *Journal of Microbiology and Biotechnology*

Night of the Open Door – ASU public outreach event – table presenter (4 years; 2014 - 2017)

Certifications

Engineer in Training (F. E. passed in May, 2007)

Professional Membership

Association of Environmental Engineering and Science Professors (AEESP) 2015-present

Graduate Students for the Environment, ASU (Founder (2013), Vice President (2013-2014), and President (2015)), 2013-2017

Algal Biomass Organization (ABO) 2016-2017