

# MENG WANG

## Assistant Professor in Environmental Systems Engineering

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### EDUCATION

University of Massachusetts Amherst, USA	PhD in Civil Engineering	2013
Xi'an Jiaotong University, Xi'an, China	MS in Environmental Engineering	2008
Zhengzhou University, Zhengzhou, China	BS in Environmental Engineering	2005

### RESEARCH INTERESTS AND EXPERTISE

- Biological wastewater treatment and water reuse
- Nutrient and energy recovery
- Municipal solid waste (MSW) management
- Sustainable Food-Energy-Water Nexus
- Bioremediation
- Environmental sustainability

### PROFESSIONAL EXPERIENCE

**Assistant Professor in Environmental Systems Engineering** Sep. 2018- present  
John and Willie Leone Family Department of Energy and Mineral Engineering, Penn State University

**Postdoctoral Research Associate and Instructor** 2013 - 2018  
Department of Civil and Environmental Engineering, University of South Florida

**Research Assistant** 2008-2013  
Department of Civil and Environmental Engineering at University of Massachusetts Amherst

**Engineer Intern** 2010  
Frevar KF Municipal Enterprise and Aquateam, Norway

**Research Assistant** 2005-2008  
School of Energy and Power Engineering at Xi'an Jiaotong University, China

### PEER-REVIEWED JOURNAL PUBLICATIONS (\*=students mentored)

- [1] **Wang, M.**, Payne, K., Tong, S. and Ergas, S (2018). Hybrid algal photosynthesis and ion exchange (HAPIX) process for high ammonium strength wastewater treatment. *Water Research*. 142: 65-74.
- [2] **Wang, M.**, Keeley, R., Zalivina, N\*, Halfhide, T., Scott, S., Zhang, Q., van der Steen, P., Ergas, S. (2018). Advances in algal-prokaryotic wastewater treatment: a review of nitrogen transformations, reactor configurations, and molecular tools. *Journal of Environmental Management*. 217: 845-857.
- [3] **Wang, M.**, Lee, E., Dilbeck, M\*, Liebelt, M.\*, Zhang, Q. and Ergas, S. (2017). Thermal pretreatment of microalgae for biomethane production: experimental studies, kinetics, and energy analysis. *Journal of Chemical Technology and Biotechnology*. 92:399-407.
- [4] Lee, E., Cumberbatch, J., **Wang, M.**, and Zhang Q. (2017). Kinetic parameter estimation model for anaerobic co-digestion with waste activated sludge and microalgae. *Bioresource Technology*. 228: 9-17.
- [5] Amini, A., Aponte-Morales, V., **Wang, M.**, Dillbeck, M.\*, Manser, N., Zhang, Q., Cunningham, J., Lahav, O., Ergas, S. (2017). Cost-effective treatment of swine wastes through the recovery of energy and nutrients. *Waste Management*. 69:508-517.
- [6] **Wang, M.**, Lee, E., Zhang, Q. and Ergas, S (2016). Anaerobic co-digestion of swine manure and microalgae *Chlorella sp.*: experimental studies and energy analysis. *BioEnergy Research*. 9: 1-12.

- [7] Manser, N., **Wang, M.**, Ergas, S., Mihelcic, J., Mulder, A., van de Vossenbergh, J., van Lier J., and van der Steen, P. (2016) Biological nitrogen removal in a photo-sequencing batch reactor with an algal-nitrifying bacterial consortium and anammox granules. *Environmental Science & Technology Letters*. 3: 175-179.
- [8] Arashiro, L.\*, Rada-Ariza, A., **Wang, M.**, van der Steen P., and Ergas, S. (2016). Modeling shortcut nitrogen removal from wastewater using an algal-bacterial consortium. *Water Science and Technology*. 75: wst2016561.
- [9] **Wang, M.**, Yang, H.\*, van der Steen, P. and Ergas, S. (2015). A novel shortcut nitrogen removal process using an algal-bacterial consortium in a photo-sequencing batch reactor (PSBR). *Water Research*. 87: 38-48.
- [10] **Wang, M.** and Park, C. (2015). Investigation of anaerobic digestion of *Chlorella* sp. and *Micractinium* sp. grown in high-nitrogen wastewater and their co-digestion with waste activated sludge. *Biomass and Bioenergy*, 80: 30-37.
- [11] **Wang, M.**, Kuo-Dahab, C., Dolan, S. and Park, C. (2014). Kinetics of nutrient removal and expression of extracellular polymeric substance by microalgae *Chlorella* sp. and *Micractinium* sp. in wastewater treatment. *Bioresource Technology*. 154: 131-137.
- [12] **Wang, M.**, Sahu, A., Rusten, B. and Park, C. (2013). Anaerobic co-digestion of microalgae *Chlorella* sp. and waste activated sludge. *Bioresource Technology*. 142: 585-590.
- [13] Baek, K., **Wang, M.**, McKeever, R., Rieber, K., Park, C., and Nüsslein, K. (2013). Biodegradation of low concentrations of 1,2-dibromoethane in groundwater is enhanced by phenol. *Applied Microbiology and Biotechnology*. 98: 1329-1338.
- [14] Yuan, X., **Wang, M.**, Park, C., Kumar, A., Sahu, A., Ergas, S. (2012). Microalgae growth using high-strength wastewater followed by anaerobic co-digestion. *Water Environment Research*. 84: 396-404.

#### **BOOK CHAPTER**

- [1] **Wang M.**, Chapter III.3 "Environmental applications of microalgae: CO<sub>2</sub> capture and nutrient recycling" in Book "Microalgae as a Source of Bioenergy: Products, Processes and Economics" (2017). Bentham Science Publishers.

#### **CONFERENCE PROCEEDINGS AND PRESENTATIONS (\*=students mentored)**

- [1] **Wang, M.**, Payne, K., Tong, S., Ergas S. (2017). A hybrid algal photosynthesis and ion-exchange (HAPIX) process for side stream wastewater treatment: experimental and modeling studies. Oral presentation and conference proceeding. *Water Environment Federation 90th Annual Technical Exhibition and Conference (WEFTEC 2017)*, Chicago, IL.
- [2] **Wang, M.**, Payne, K., Tong, S., Ergas S. (2017). Hybrid Ion Exchange and Algae for High Strength Side Stream Wastewater Treatment. Oral presentation and conference proceeding. *WEF Nutrient Symposium*, June 12-14, Ft. Lauderdale, FL.
- [3] Zalivina, N.\*, Keeley, R., **Wang, M.**, Arashiro, L.T., Scott, K., Ergas, S.J., van der Steen, P. (2017). Effect of Solids Retention Time on Nitrogen Removal and Microbial Consortium in a Novel Algal-Bacterial Shortcut Nitrogen Removal System, *WEF Nutrient Symposium*, June 12-14, Ft. Lauderdale, FL.
- [4] Arashiro, L.\*, Rada-Ariza, A., **Wang, M.**, van der Steen P., and Ergas, S. (2016). Modeling shortcut nitrogen removal from wastewater using an algal-bacterial consortium. Oral presentation and conference proceeding. *13th Leading Edge Conference on Water and Wastewater Technologies*, Jun. 13-16, 2016, Spain.
- [5] **Wang, M.**, Liebelt, M.\*, Dilbeck, M.\*, and Ergas, S. (2015). Thermal pretreatment of microalgae for biogas production. *WEF/IWA Residuals and Biosolids Conference*, Washington D.C.
- [6] **Wang, M.**, Yang, H.\*, and Ergas, S., Van der Steen, P. (2015) A novel shortcut nutrient removal process by an algal-bacterial consortium in a sequencing batch photobioreactor. *12th Leading Edge Conference on Water and Wastewater Technologies*, Hong Kong, China (accepted)
- [7] **Wang, M.**, Lee, E., Zhang, Q and Ergas, S. (2014) Energy production from anaerobic co-digestion of swine manure and microalgae *Chlorella* sp. Oral presentation and conference proceeding, *Water Environment Federation 87th Annual Technical Exhibition and Conference (WEFTEC 2014)*, New Orleans, LA.
- [8] Amini, A. Veronica Aponte-Morales, V., **Wang, M.**, et al. (2014). A proposed treatment train for sustainable energy and nutrient recovery from swine waste. Poster presentation and conference proceeding,

*Water Environment Federation 87th Annual Technical Exhibition and Conference (WEFTEC 2014)*, New Orleans, LA.

- [9] **Wang, M.**, Kuo-Dahab, C. and Park C. (2013) Investigation of characteristics of microalgae grown in different wastewater and their enhancing anaerobic digestibility of waste activated sludge. Oral presentation and conference proceeding, *Water Environment Federation 86th Annual Technical Exhibition and Conference (WEFTEC 2013)*, Chicago, IL.
- [10] **Wang, M.**, Zhu, Z., Dolan, S. and Park, C. (2012) Cultivation and anaerobic co-digestion of microalgae for wastewater treatment systems. Oral presentation and conference proceeding, *International Water Association (IWA) Water Congress*, Busan, Korea.
- [11] **Wang, M.** and Park, C. (2012) Improving the digestibility of micro green algae by anaerobic co-digestion with waste activated sludge. Oral presentation and proceeding, *Water Environment Federation 26th Annual Residuals and Biosolids Management Conference*, Raleigh, NC.
- [12] **Wang, M.**, Zhu, Z., Dolan, S., and Park, C. (2012) Investigation of algal cultivation and anaerobic co-digestion of sewage sludge and algae at wastewater treatment plant (WWTP). Conference proceeding, *Water Environment Federation 85th Annual Technical Exhibition and Conference (WEFTEC 2012)*, New Orleans, LA.
- [13] Teague, P., **Wang, M.** and Park, C. (2011) Predicting the digestibility of sludge using EPS analysis, Conference proceeding, *Water Environment Federation 84th Annual Technical Exhibition and Conference (WEFTEC 2011)*, Los Angeles, CA.
- [14] **Wang, M.**, Teague, P., and Park, C. (2010) Effects of feeding patterns on extracellular polymer substances (EPS) and digestibility of activated sludge. Poster and conference proceeding, *Water Environment Federation 83th Annual Technical Exhibition and Conference (WEFTEC 2010)*, New Orleans, LA.
- [15] Yuan, X., **Wang, M.**, Park, C., Sahu, A.K., and Ergas, S.J. (2010) Microalgae growth using high strength wastewater followed by anaerobic co-digestion. Oral presentation and proceeding, *Water Environment Federation 83th Annual Technical Exhibition and Conference (WEFTEC 2010)*, New Orleans, LA.
- [16] **Wang, M.**, Teague, P., and Park, C. (2010) Effects of activated sludge reactor and EPS on anaerobic digestion and sludge pretreatment. Oral presentation and conference proceeding, *Water Environment Federation 24th Annual Residuals and Biosolids Management Conference*, Savannah, GA.
- [17] Park, C., Nüsslein, K., Teague, P, and **Wang, M.** (2009) Effects of feeding patterns on activated sludge characteristics and its digestibility in anaerobic digestion. Oral presentation and conference proceeding, *Water Environment Federation 82th Annual Technical Exhibition and Conference (WEFTEC 2009)*, Orlando, FL.

#### **CONFERENCE ABSTRACTS AND INVITED PRESENTATIONS (\*=students mentored)**

- [1] **Wang, M.**, Payne, K., Tong, S., Ergas, S.J. (2018). Resource Recovery From Anaerobic Digestion Effluent By A Hybrid Algal Photosynthesis And Ion-exchange Process. *IWA Leading Edge Conference on Water and Wastewater Technologies (IWA-LET)*, Nanjing, China, May 27-May 31, 2018.
- [2] Zalivina, N., Sanford, S., Sokefun, T., **Wang, M.**, Ergas, S.J. (2018). Application of an Anammox-enhanced Zeolite System for Nitrogen Removal from Anaerobic Digestion Sidestreams. *Florida Water Resources Conference (FWRC)*, Daytona Beach, FL, April, 2018. (First place for the poster competition).
- [3] Dixon, P., Waris, A., Lacroff, P., Lee, E., **Wang, M.**, Zhang, Q., Mihelcic, J., and Ergas, S. (2018) Energy From Biosolids and Municipal Solid Waste: Effect of Organic Loading Rate on Methane Yield, *Florida Water Resource Conference (FWRC)*, Daytona Beach, FL, April, 2018.
- [4] **Wang, M.** (2017). Nutrient and energy recovery from different waste streams. Case Western Reserve University, Cleveland, OH.
- [5] **Wang, M.**, Payne, K., Tong, S., Ergas S. (2017). Hybrid ion-exchange (IX) and algae for high strength side stream wastewater treatment, 1st IWA Conference on Algal Technologies for Wastewater Treatment and Resource Recovery, March 16-17, Delft, The Netherlands.
- [6] **Wang, M.** (2016). Nutrient management and bioenergy production from anaerobic digestion. New Mexico State University, Las Cruces, NM.
- [7] Kim, Y., **Wang, M.**, Ergas S., Zhang, Q. (2016). A sustainable energy supply system in aquaculture.

Poster presented at the World Aquaculture Society Conference, Feb. 22-26, Nevada, LV.

[8] **Wang, M.**, Yang, H.\*, and Ergas, S., Van der Steen, P. (2015). A novel shortcut nutrient removal process by an algal-bacterial consortium in a sequencing batch photobioreactor (SBPB). Oral presentation, *249<sup>th</sup> ACS National Meeting & Exposition*, Denver, CO.

[9] **Wang, M.**, and Ergas, S.J. (2014). Anaerobic co-digestion of swine manure and microalgae for biogas production, Poster presentation, *2014 International Biomass Conference & Expo*, Orlando, FL, March 24-26.

[10] **Wang, M.**, Lee, E., Zhang, Q. and Ergas, S.J. (2014). Anaerobic co-digestion of algae and swine manure. Poster presentation, *Florida Energy Systems Consortium Workshop*, Gainesville, FL, May 12-13.

[11] **Wang, M.** Microalgae grown in different wastewaters and their anaerobic co-digestion with waste activated sludge (2014). *Civil and Environmental Engineering Seminar*, University of South Florida.

[12] **Wang, M.**, and Park, C. Investigating the nitrogen removal by microalgae in N-rich wastewater and anaerobic digestion of their biomass as biomethane feedstock. Oral presentation, *The 6th International conferences on "Challenges in Environmental Science and Engineering" (CESE 2013)*, Daegu, Korea.

[13] **Wang, M.** Application of microalgae for nutrient removal and anaerobic digestion at wastewater treatment plants. *Civil and Environmental Engineering Seminar*, University of Massachusetts Amherst. Jan. 2013

[14] **Wang, M.** and Park, C. (2011) Anaerobic co-digestion of microalgae and activated sludge from wastewater treatment systems. Oral presentation, *Annual Northeast Residuals & Biosolids Conference*, Seekonk, MA.

[15] Teague, P., **Wang, M.**, and Park, C. (2010). The effect of iron concentration and aeration basin configuration on susceptibility to sonication pretreatment and subsequent anaerobic digestion. Poster presentation, *Water Environment Federation 83th Annual Technical Exhibition and Conference (WEFTEC 2010)*, New Orleans, LA.

## **TEACHING EXPERIENCE**

### **Instructor I**

**University of South Florida**

**2015-2017**

- Taught graduate level course EES6107 "*Biological Principles of Environmental Engineering*" (12 students).
- Taught undergraduate level course ENV4004L "*Environmental Engineering Lab*," and integrated research projects into the undergraduate curriculum (27 students).
- Assisted in teaching CWR4812 "*Capstone Water Resources/Environmental Design*" (5 projects and 21 students).

### **Teaching Assistant in Department of Civil and Environment Engineering UMass-Amherst 2009-2012**

- Lab instructor for undergraduate and graduate level courses: CEE471 "*Water and Wastewater Treatment*" (85 students); CEE370 "*Environmental Engineering Principles*" (67 students); and CEE671 "*Biological Processes for Environmental Engineering*" (10 students).

## **PROFESSIONAL SERVICE**

- NSF review panelist: CAREER and SBIR
- Reviewer for *Global Water Pathogens Project (GWPP)*: <http://www.waterpathogens.org/>.
- Journal reviewer for *Environmental Science and Technology*, *Water Research*, *Algal Research*, *Science of the Total Environment*, *RSC Advances*, *Waste Management*, *Reviews in Environmental Science and Biotechnology*, *Bioresource Technology*, *Biomass & Bioenergy*, *Chemosphere*, *Journal of Environmental Quality*, *Industrial & Engineering Chemistry Research*, and *Desalination and Water Treatment*.
- Organized the Biological Waste-to-Energy (BioWET) symposia in the summers of 2013 and 2014 at USF. Students and faculty members from USF, IHE-Delft (Delft, The Netherlands), Prague University of Chemical Technology (Prague, Czech Republic), and Costa Rica participated in the symposium.

## **RESEARCH GRANTS**

- "A Novel Algal-Bacterial Shortcut Nitrogen Removal Process for Wastewater Treatment" (Award No. 1511439; \$330,000 from Aug. 2015- Jul. 2018) Role: Senior Scientist

- NSF Innovation Corps (I-Corps™) proposal (Award \$50,000 from 2017-2018). Role: Entrepreneurial Lead

#### **AWARDS, HONORS, AND SCHOLARSHIPS**

- First Place of 2016/2017 EESF/AEESP Student Video Competition (Postdoctoral Advisor)
- Quantitative Microbial Risk Assessment Interdisciplinary Instructional Institute Travel Award, 2015
- Elsevier Tropical Connections Fellowship, 2015
- Graduate Student Travel Grant, 2012, University of Massachusetts Amherst

#### **PROFESSIONAL AFFILIATIONS AND CERTIFICATION**

- Water Environment Federation (WEF)
- International Water Association (IWA)
- Association of Environmental Engineering and Science Professors (AEESP)
- Florida Water Environment Association (FWEA)
- Southeastern Branch of American Society for Microbiology (ASM)
- Certification in Quantitative Microbial Risk Assessment (QMRA), Michigan State University