Eunyoung Lee

(813) 442-0031 | eunyounglee@mail.usf.edu

SUMMARY

- Ph.D. in Civil Engineering with expertise in microalgae cultivation systems, anaerobic digestion systems, kinetic and process modeling, and life cycle environmental and economic assessments
- Experience in mentoring undergraduate and graduate students
- Research interests including sustainability, life cycle environmental and economic assessments, and energy-water-food nexus

EDUCATION

University of South Florida, Tampa, FL 2011-2017
*Ph.D. in Civil Engineering***,** GPA: 3.94/4.0
Awards: USF Graduate Fellowship (2011-2012)
Dissertation: Carbon and Nutrient Balances in Microalgal Bioenergy System (Advisor: Dr. Qiong Zhang)

Myongji University, Youngin, South Korea 2008-2010
*M.S. in Environmental Engineering & Biotechnology***,** GPA: 4.44/4.5
Awards: Excellent Freshman Scholarship (2008-2009), BK21 Scholarship (2008-2009)
Thesis: Removal of COD and color from anaerobic digestion effluent of livestock wastewater by ozone/UV-based advanced oxidation (Advisor: Dr. Kisay Lee)

Myongji University, Youngin, South Korea 2002-2008
*B.S. in Environmental Engineering & Biotechnology***,** GPA: 4.14/4.5
Awards: Honor Roll Scholarship (2003, 2005, 2006), Baekma Scholarship (2004, 2007)
Honors Thesis: Distribution of antibiotic-resistant bacteria in Kyeong-An river (Advisors: Dr. Byungrang Lim and Dr. Kisay Lee)

PROFESSIONAL EXPERIMENCE

Post-Doctoral Researcher, University of South Florida, Tampa, FL 2017 to present

- Conducting research on high-solids anaerobic digestion in terms of lab-scale experiments (batch and semi-continuous reactors), life cycle assessment, and life cycle cost analysis
- Mentoring students who are conducting high-solids anaerobic digestion, short-cut nitrogen removal process, and nitrogen recovery from urine through ion-exchange process (5 undergraduate students, 1 master's student, 2 doctoral students)
- Preparing manuscripts on high-solids anaerobic digestion in international journals

Graduate Research Assistant 2008-2017

University of South Florida, Tampa, FL

- Affiliated researcher with the National Science Foundation's Partnerships for International Research and Education (PIRE), USF's largest sustainability grant (PIs: James R. Mihelcic, Maya Trotz, Camille A. Mckayle, and Christian Wells, Sept. 2012-present). Conducting research on energy and nutrient recovery from the integrated microalgae bioenergy systems (microalgae cultivation integrated with wastewater, anaerobic co-digestion with microalgae and waste activated sludge, process modeling for the integrated system, and life cycle assessment of the integrated system).
- Affiliated researcher with the Hinkley Center for Solid & Hazardous Waste Management. Conducting research on life cycle environmental and economic assessment of high-solids anaerobic digestion of organic faction of municipal solid waste with biosolids from wastewater treatment (PIs: Sarina J. Ergas and Qiong Zhang, Jan. 2017-Aug. 2017).

Myongji University, Youngin, South Korea

- Assistant researcher with following research topics
  1) "Study on the distribution of antibiotic resistant bacteria in river water and treated effluents in Kyongan River," KENTEC (Kyonggi Regional Environmental Technology Development Center), PI: Kisay Lee, May. 2007 – Feb. 2008.
  2) "Study on the removal of antibiotics and antibiotic-resistant bacteria from the treated effluent of animal wastewater," KENTEC (Kyonggi Regional Environmental Technology Development Center), PI: Kisay Lee, April 2008 – Jan. 2009.
  3) "Physicochemical capture and biological fixation of CO_2 using microalgal photobioreactor," National Research Foundation of Korea, PI: Kisay Lee, Sept. 2009 –Aug. 2010

Internships

- Kyonggi Regional Environmental Technology Development Center (KENTEC), South Korea Jan.-Feb., 2008
  Research Assistance for "Study on the distribution of antibiotic resistant bacteria in river water and treated effluents in Kyongan River"

- Industry and Academia Cooperation Foundation, South Korea Mar.-Aug., 2010
  1) Assistance for research management and accounting
  2) Research assistance for "Degradation of organic contaminants and disinfection using micro-bubbled ozone oxidation"

Field Engineer, TrueAlgae, Inc., Plant City, FL Mar.-June, 2018

- Cultivating microalgae in vertical photo-bioreactor, producing microalgae-based products, and monitoring the productivity of microalgae and microalgae –based products

EXPERIENCE IN TEACHING AND MENTORING

Teaching Assistant

- Environmental Analysis Laboratory 2008-2010
  Department of Environmental Engineering & Biotechnology, Myongji University
- Statics and Geotech Engineering 2011-2017
  Department of Civil and Environmental Engineering, University of South Florida

Graduate Assistant

- Assistance for INTO pathway program 2015-2016
  Department of Civil and Environmental Engineering, University of South Florida

Graduate research mentor 2012-present

- To assist to develop an ability to design and perform experiments and publish their research in peer- reviewed journals
  *8 Undergraduate students and 6 Master's students

EXPERIENCE IN COMMUNITY ENGAGEMENT

Middleton High School, *Volunteer*, Tampa, FL 2012

- Science project teacher for Biology class
- Installed microalgae photobioreactors and cultivated microalgae under different conditions

Morning Star Fishermen, *Volunteer*, Dade City, Florida 2015-2016

- Aquaponics operation and maintenance
- Research on biogas production using anaerobic co-digestion of fish waste and moringa leaves

University of South Florida, *Volunteer*, Tampa, FL 2016-2018

- Teaching assistant for Environmental Engineering laboratory class
- Teaching basic water chemical analysis and hydrology laboratory

Food Studies Research Initiative, *Volunteer*, Tampa, Florida 2017 to Present

- Sustainability consulting for USF campus in Tampa
- Assisting them to analyze energy usage, environmental impact, and associated operating costs for anaerobic digestion of food waste

PEER-REVIED JOURNAL PUBLICATION

- **Published papers**
  - **Review paper**

Lee E., Jalalizadeh M., & Zhang Q. (2015). Growth kinetic models for microalgal biofuel: A review. Algal research. 12 497-512.

  - **Research paper**

Lee, E., Cumberbatch, J., Wang, M., & Zhang Q. (2017). Kinetic parameter estimation model for anaerobic co-digestion of waste activated sludge and microalgae. Bioresource technology, 228, 9-17.

Lee, E., & Zhang, Q. (2016). Integrated co-limitation kinetic model for microalgae growth in anaerobically digested municipal sludge centrate. Algal Research, 18, 15-24.

Wang, M., Lee, E., Dilbeck, M. P., Liebelt, M., Zhang, Q., & Ergas, S.J. (2016). Thermal pretreatment of microalgae for biomethane production: experimental studies, kinetics and energy analysis. Journal of Chemical Technology and Biotechnology, 92(2), 399-407.

Wang, M., Lee, E., Zhang, Q., & Ergas, S.J. (2016). Anaerobic Co-digestion of Swine Manure and Microalgae Chlorella: Experimental Studies and Energy Analysis. BioEnergy Research, 9(4), 1204-1215.

Lee, H., Lee, E., Lee, C. H., & Lee, K. (2011). Degradation of chlorotetracycline and bacterial disinfection in livestock wastewater by ozone-based advanced oxidation. Journal of Industrial and Engineering Chemistry, 17(3), 468-473.

Lee, E., Lee, H., Kim, Y. K., Sohn, K., & Lee, K. (2011). Hydrogen peroxide interference in chemical oxygen demand during ozone based advanced oxidation of anaerobically digested livestock wastewater. International Journal of Environmental Science & Technology, 8(2), 381-388.

Lee, I., Lee, E., Lee, H., & Lee, K. (2011). Removal of COD and Color from Anaerobic Digestion Effluent of Livestock Wastewater by Advanced Oxidation Using Microbubbled Ozone. Applied Chemistry for Engineering 22 (6), 617-622.

Lee, E., Lee, H., Jung, W., Park, S., Yang, D., & Lee, K. (2009). Influences of humic acids and photoreactivation on the disinfection of Escherichia coli by a high-power pulsed UV irradiation. Korean journal of chemical engineering, 26(5), 1301-1307.

- **Papers to be submitted**

Lee, E., & Zhang, Q. (2019). An integrated process model for microalgae bioenergy production coupled with wastewater treatment. Water Research. (in preparation)

Lee, E., & Zhang, Q. (2019). Life cycle assessment of microalgae bioenergy production coupled with wastewater treatment. Journal of Cleaner Production. (in preparation)

Lee, E., Bittencourt, P., Casimir, L., Jimenez, E., Wang, M., Zhang, Q., & Ergas, S.J. (2019). Biogas production from high solids anaerobic co-digestion of food waste and yard waste with sewage sludge addition. Waste Management. (in preparation)

CONFERENCE PROCEEDINGS

Dixon, P., Bittencourt, P., Lee, E., Wang, M., Jimenez, E., Zhang, Q., & Ergas, S. J. (2017). Effects of Biosolids Addition and Alkalinity Sources on High-Solids Anaerobic co-Digestion (HS-AcD) of Food Waste and Green Waste. Proceedings of the Water Environment Federation, 2017(1), 1219-1235.

Wang M., Lee E., Zhang Q., & Ergas S. (2014). Energy production from anaerobic co-digestion of swine manure and microalgae Chlorella sp. Proceedings of the Water Environment Federation. Paper presented at WEFTEC 2014 87th Annual Water Environment Federation Technical Exhibition and Conference, New Orleans Morial Convention Center, New Orleans, September 27 - October 1, Water Environment Federation.

Lee, E., Bittencourt, P., Casimir, L., Jimenez, E., Oliveira, D.S.B.L., Oliveira, L.S.B.L., Wang, M., Zhang, Q., & Ergas, S.J. (2019). Sustainable biogas production: High-solids anaerobic digestion of food waste, yard waste, and biosolids. Proceedings of the 16th World Congress on Anaerobic Digestion, Delft University of Technology, Delft, The Netherlands, June 23-27, 2019 (in review)

Lee, E., Bittencourt, P., Casimir, L., Jimenez, E., Oliveira, D.S.B.L., Oliveira, L.S.B.L., Wang, M., Zhang, Q., & Ergas, S.J. (2019). Sustainable biogas production by high solids anaerobic digestion: A case study. Paper to be presented at Florida Water Resource Conference, Tampa convention center, Florida, April 14-17, 2019 (in review)

Lee, E., Bittencourt, P., Casimir, L., Jimenez, E., Oliveira, D.S.B.L., Oliveira, L.S.B.L., Hinds, G., Wang, M., Zhang, Q., & Ergas, S.J. (2019). Sustainable biogas production by high solids anaerobic digestion of food waste, yard waste, and biosolids: A case study. Proceedings of Residuals and Biosolids Conference 2019, Fort Lauderdale Convention Center, Florida, May 7-9, 2019 (in review)

TECHNICAL REPORTS

Ergas, S., Zhang, Q., Dixon, P., Lee, E., Jimenez, E., & Bittencourt, P. "Phase II Bioenergy Production from MSW by High Solids Anaerobic Digestion", Hinkley Center for Solid & Hazardous Waste Management 2017 Quarterly Report # 1, May 2017.

Ergas, S., Zhang, Q., Lee, E., Wang, M., Dixon, P., Jimenez, E., Casimir, L. Bittencourt, P., Stolte Bezerra Lisboa Oliveira, D., & Stolte Bezerra Lisboa Oliveira, L. "Phase II Bioenergy Production from MSW by High Solids Anaerobic Digestion", Hinkley Center for Solid & Hazardous Waste Management 2017 Quarterly Report # 2, July 2017.

Ergas, S., Zhang, Q., Lee, E., Wang, M., Dixon, P., Jimenez, E., Casimir, L. Bittencourt, P., Stolte Bezerra Lisboa Oliveira, D., & Stolte Bezerra Lisboa Oliveira, L. "Phase II Bioenergy Production from MSW by High Solids Anaerobic Digestion", Hinkley Center for Solid & Hazardous Waste Management 2017 Quarterly Report # 3, October 2017.

Ergas, S., Zhang, Q., Lee, E., Wang, M., Dixon, P., Jimenez, E., Casimir, L. Bittencourt, P., Stolte Bezerra Lisboa Oliveira, D., & Stolte Bezerra Lisboa Oliveira, L. "Phase II Bioenergy Production from MSW by High Solids Anaerobic Digestion", Hinkley Center for Solid & Hazardous Waste Management 2017 Quarterly Report # 4, December 2017.

CONFERENCE PRENTATION

- **Conference oral presentations**

Lee, E., Bittencourt, P., Casimir L., Jimenez, E., Wang M., Zhang, Q., and Ergas, S. "High Solids Anaerobic Co-digestion of Food and Yard Waste with Biosolids for Biogas Production", Global Waste Management Symposium, Palm Spring, CA, USA, Feb 11-14, 2018.

Dixon, P., Bittencourt, P., Lee, E., Wang, M., Jimenez, E., Zhang, Q., & Ergas, S. "Effects of Biosolids Addition and Alkalinity Sources on High-Solids Anaerobic co-Digestion (HS-AcD) of Food Waste and Green Waste", WEF Residuals and Biosolids Conference, Seattle WA, USA, April 8-11, 2017.

Lee, E., & Zhang, Q. "Modeling algal growth kinetics on wastewater", BioWET mini-symposium at USF Tampa, FL, USA, August 2, 2013.

Lee, E., & Zaribaf, B.H. "Applications of LCA to Algae production system", BioWet Summer School, USF, Tampa, FL, USA, July 23, 2012.

Lee E., Lee, H., & Lee, K. "A study of COD and color removal in swine wastewater by two-step oxidation with microbubbled ozone and ultraviolet irradiation," AOTs-15 (15th Advanced Oxidation Technologies for Treatment of Water, Air and Soil), Niagara Falls, NY, USA, October 5-8, 2009.

Lee E., Lee, H., & Lee, K. "Removal of non-biodegradable organics and color from a livestock wastewater by advanced oxidation based upon O_3/UV," AOTs-15 (15th Advanced Oxidation Technologies for Treatment of Water, Air and Soil), Niagara Falls, NY, USA, October 5-8, 2009.

Lee, H., Lee E., & Lee, K. "Degradation of antibiotic compounds and disinfection capability in livestock wastewater by UV/O_3-based advanced oxidation," AOTs-15 (15th Advanced Oxidation Technologies for Treatment of Water, Air and Soil), Niagara Falls, NY, USA, October 5-8, 2009.

- **Conference poster presentations**

Oliveira, L.S.B.L., Oliveira, D.S.B.L., Lee, E., Jimenez, E., Ergas, S., & Zhang, Q. "Life Cycle Assessment for High Solids Anaerobic Digestion of Food Waste, Yard Waste, and Biosolids", The Thirty-Third International Conference on Solid Waste Technology and Management, Annapolis, MD. (March 11-14, 2018)

Lee, E., Bittencourt, P., Jimenez, E., Casimir, L., Wang, M., Dixon, P., Zhang, Q., & Ergas, S. "High-Solids Anaerobic Co-digestion of Food Waste and Yard Waste with Biosolids for Sustainable Bioenergy Production", FAMU ENERGYWATERFOODNEXUS 2017 International Summit, DoubleTree Hotel at Orlando Airport, Orlando, FL. (October 19-20, 2017)

Lee, E., & Zhang, Q. "Life Cycle Assessment for Microalgae Bioenergy Production coupled with Wastewater Treatment", Renewable Energy systems and Sustainability Conference, Florida Polytechnic University, Lakeland, FL. (July 31-August 1, 2017)

Dixon, P., Lee, E., Bittencourt, P., Jimenez, E., Casimir, L., Wang, M., Zhang, Q., & Ergas, S. "Effects of Biosolids Addition and Alkalinity Sources on High-Solids Anaerobic Co-digestion of Food Waste and Green Waste", Renewable Energy systems and Sustainability Conference, Florida Polytechnic University, Lakeland, FL. (July 31-August 1, 2017)

Dixon, P., Lee, E., Bittencourt, P., Jimenez, E., Casimir, L., Wang, M., Zhang, Q., & Ergas, S. "Effects of Biosolids Addition and Alkalinity Sources on High-Solids Anaerobic Co-digestion of Food Waste and Green Waste", SWANA FL 2017 Summer Conference and Hinkley Center Colloquium, Sanibel Harbour Marriott Resort, Fort Myers, FL, USA (July 23-25, 2017)

Dixon, P., Bittencourt, P., Jimenez, E., Wang, M., Lee, E., Zhang, Q., & Ergas, S. "Alkalinity and Temperature Effects on Methane (CH4) Yield in High-Solids Anaerobic co-Digestion (HS-AcD)", Florida Water Resources Conference (FWRC), Palm Beach County Convention Center, West Palm Beach, FL, USA (April 23-26, 2017)

Lee, E., & Zhang, Q. "Development of a kinetic model for microalgae growth in wastewater", 2015 AEESP Research and Education Conference, Yale University, New Haven, CT, USA (June13-16, 2015)

Lee, E., & Zhang, Q. “Development of a kinetic model for microalgae growth in wastewater”, College of Engineering Research Day 2014, USF Marshall Student Center Ballroom, Tampa, FL, USA (Nov. 19, 2014) * win a 2014 College of Engineering Research Week Poster Award Honorable Mention

Lee, E., & Zhang, Q. “Development of a kinetic model for microalgae growth in wastewater”, 4th International Conference on Algal Biomass, Biofuels, and Bioproducts, Santa Fe Convention Center, New Mexico, USA (June 15-18, 2014)

Lee, E., & Zhang, Q. “A kinetic model for microalgae growth in wastewater”, Florida Energy System Consortium Workshop, The Hilton University of Florida Conference Center, Gainesville, FL, USA. (May 12-13, 2014)

Lee, E., & Zhang, Q. “A kinetic model for microalgae growth in wastewater”, AEESP Distinguished Lecture Series Poster reception, USF, Tampa, FL, USA. (Jan. 29, 2014)

Lee, H., Lee, E., & Lee, K. "Antibiotics degradation and disinfection of antibiotic-resistant bacteria in UV/O_3-based advanced oxidation process," ISBBE 2009, P-066, ECUST, Shanghai, China, August 3-6, 2009.

Lee, E., Lee, H., Park, J., & Lee, K. "Nitrogen removal by microalgae and application of advanced oxidation to remove COD and color in livestock wastewater treatment," ISBBE 2009, P-061, ECUST, Shanghai, China, August 3-6, 2009.

Lee, E., Lee, H., & Lee, K. “Antibiotics degradation and disinfection of antibiotic-resistant bacteria in O_3/UV advanced oxidation process,” Korean Society of Water Quality, November 18-19, 2009. Incheon, South Korea

Lee, E., Lee, H., & Lee, K. “Removal of non-biodegradable organics and color from biological treatment effluent of livestock wastewater by ozone-based advanced oxidation,” Korean Society of Water Quality, November 18-19, 2009. Incheon, South Korea

Lee, E., Lee, H., & Lee, K. “Removal of COD and Color in livestock wastewater by ozone-based advanced oxidation processes,” Korean Society of Water Quality, April 17, 2009. Suwon, South Korea.

Lee, H., Lee, E., & Lee, K. “Characteristics of antibiotics degradation by advanced oxidation process of UV/H_2O_2, Korean Society of Industrial Engineering Chemistry, November 12-14, 2008. Jeju, South Korea.

Lee, E., Lee, K., & Lim, B. “Distribution of antibiotic-resistant bacteria in river and WTPs effluent,” Korean Society of Water and Wastewater, November 15-16, 2006. Daegu, South Korea. *win the Best Poster Award

SKILLS AND LANGUAGES

Computer Skills: Matlab, SimaPro profession 8, Arc GIS (Basic)

Experimental Skills: Microbiogical methods - Cultivation of bacteria and microalgae & culture stock preservation
- Analyses of HPC (heterotrophic plate counts), ASFs (aerobic spore formers)
- Antibiotic-resistant bacteria

Analytical methods - TOC (total organic carbon) analyzer
- GC-TCD (detection of CO_2, H_2S, CH_4)
- IC (detection of NH_4^+, Mg^{2+}, NO_3^-, NO_2^-, Cl^-, etc.)
- Ammonia analyzer (a diffusion conductivity method)
- Chlorophyll a
- Other water quality analysis (pH, COD, TN, TP, etc.)

Instrumentation/Operation - Ozone generator and reactor
- Pulsed UV generator and reactor
- Activated carbon adsorption column with fraction collector
- Ion-change using zeolite and synthetic resin for batch and column
- Microalgae Photobioreactor
- Liquid and solid states anaerobic digestion reactor

Languages: Korean (Native), English

CERTIFICATES

Microsoft Office Word 2003 Expert, Microsoft Office Excel 2003 Expert, Microsoft Office PowerPoint 2003 Core, Microsoft Office Access 2003 Core, and Microsoft Office 2003 Editions Master

AFFILIATIONS

Association of Environmental Engineering &Science Professors