KELLY J. MARTIN

Postdoctoral Research Associate
Department of Civil and Environmental Engineering
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EDUCATION

2006-2013 **Ph.D., Environmental Engineering**
University of Notre Dame *Notre Dame, Indiana*

Dissertation: Effect of Counter-Diffusion, Fluid Dynamics, and Detachment on Membrane–Supported Biofilms
Advisor: Robert Nerenberg, Ph.D., P.E.

- Visiting student, Delft Technical University, The Netherlands, April-June 2010

2001-2006 **B.S., Engineering**
Grand Valley State University *Allendale, Michigan*

- Emphases in environmental and mechanical
- Minor in chemistry
- Honors College

RESEARCH EXPERIENCE

2013-present **Postdoctoral Research Associate**
University of Michigan *Ann Arbor, Michigan*

- Designed, built, and operated a membrane biofilm reactor and granular sludge sequencing batch reactor for treatment of anaerobic effluents
- Modeled the secondary wastewater treatment process of the Detroit Water and Sewerage Department and determined kinetic parameters
- Evaluated carbohydrate and protein content of biofilms associated with point-of-use drinking water filters
- Developed methods for DNA extraction from fabrics associated with point-of-use drinking water filters for Illumina sequencing

2006-2013 **Graduate Research Assistant**
University of Notre Dame *Notre Dame, Indiana*

- Developed a multidimensional, multispecies, agent-based model for the membrane biofilm reactor, accounting for fluid dynamics, mass transport, and detachment
  (in collaboration with Cristian Picioreanu, Delft University of Technology)
- Evaluated the effect of biofouling layer roughness on ultrafiltration membrane permeate flux using a multidimensional fluid dynamics model
  (in collaboration with Eberhard Morgenroth, EAWAG)
- Operated an experimental membrane biofilm reactor flow cell for qualitative observations of biofilm development and detachment
- Initiated work on the incorporation of an anaerobic fluorescent protein in *P. aeruginosa* for anaerobic visualization studies
- Built and operated a bench scale hydrogen-based membrane biofilm reactor for biological bromate reduction and performed microbial community analysis
- Completed the Hopkins Microbiology Course, Stanford University, Summer 2007

TEACHING AND MENTORING EXPERIENCE

2014-present **Independent Study Mentor**
University of Michigan *Ann Arbor, Michigan*

- Advised student in the experimental determination of kinetic parameters for the Detroit wastewater treatment plant secondary process

2010-present **Research Mentor**
- Nigel Beaton, Jeseth Delgado Vela, and Chia Chen Wu, U. of Michigan graduate students
- Sarah Keithley, University of Notre Dame, currently at University of Texas graduate student

2013 **Postdoctoral Short-Course on College Teaching in Science and Engineering**
University of Michigan, Center for Teaching and Learning Research *Ann Arbor, Michigan*
- Certificate of completion
- Covered topics including course design, effective lecturing, inclusion and student retention, and active learning

Spring 2012 **Advanced Teaching Assistant for Wastewater Treatment Design**
University of Notre Dame *Notre Dame, Indiana*
- Lectured at least once per week on fundamental microbiology and wastewater topics
- Instructed students on process modeling (BIOWIN)
- Held office hours and assisted students with senior project

2006-2008 **Teaching Assistant**
University of Notre Dame *Notre Dame, Indiana*
Methods of Civil Engineering; Materials; and Wastewater Treatment Design Class

OTHER EXPERIENCE

2006 **Design and Controls Intern,** *JR Automation Technologies, LLC* *Holland, Michigan*

Summer 2005 **Michigan DEQ Intern,** *Birds Eye Foods* *Fennville, Michigan*

PEER REVIEWED MANUSCRIPTS

Martin, K. J., Bolster, D., Derlon, N., Morgenroth, E., and Nerenberg, R. (2014) "Effect of Fouling Layer Spatial Distribution on Permeate Flux: A Theoretical and Experimental Study" *Journal of Membrane Science 471: 130-137. (available online only; will be published in December 2014).*

Pavissich, J. P., Aybar, M., **Martin, K. J.**, and Nerenberg, R. (2014) "A Methodology to Assess the Effects of Biofilm Roughness on Substrate Fluxes Using Image Analysis, Substrate Profiling, and Mathematical Modelling" *Water Science and Technology* 69 (9): 1932-1942.

Martin, K. J., Picioreanu, C., and Nerenberg, R. (2013) "Multidimensional Modeling of Biofilm Development and Fluid Dynamics in a Hydrogen-Based Membrane Biofilm Reactor (MBfR)" *Water Research* 47: 4739-4751.

Martin, K. J. and Nerenberg, R. (2012) "The Membrane Biofilm Reactor (MBfR) for Water and Wastewater Treatment: Principles, Applications, and Recent Developments" *Bioresource Technology* 122: 83-94.

Martin, K. J., Downing, L. S., Nerenberg, R. (2008) "Evidence of Specialized Bromate-Reducing Bacteria in a Hollow Fiber Membrane Biofilm Reactor" *Water Science & Technology* 59 (10): 1969-1974.

SUBMITTED MANUSCRIPTS

Martin, K. J., Picioreanu, C., and Nerenberg, R. "Evaluating Competition in a Hydrogen-Based, Membrane Biofilm Reactor (MBfR) Using Numerical Modeling" submitted to *Biotechnology and Bioengineering*, October 2014.

MANUSCRIPTS IN PREPARATION FOR SUBMISSION WITHIN THE ACADEMIC YEAR

Delgado Vela, J., Stadler, L. B., **Martin K. J.**, Bott, C. B., Love, N. G. "Managing Nitrogen in Mainstream Anaerobic Effluents: Challenges and Opportunities."

Martin, K. J., Takacs, I., and Love, N. G. "Use of Process Modeling to Minimize Solids Production by the Detroit Wastewater Treatment Plant."

Wu, C. C., **Martin, K. J.**, Pinto, A., Olson, T. M., and Love, N. G. "Effect of Chlorinated Phenol on Microbial Colonization in Point-of-Use (PoU) Drinking Water Filters."

SELECT CONFERENCE PAPERS

Delgado-Vela, J., **Martin, K. J.**, Stadler, L. B., Bott, C. B., Skerlos, S. J., Raskin, L., and Love, N. G. (2014) "Nutrient Removal Downstream of an Anaerobic Membrane Bioreactor for Domestic Wastewater Treatment**"** *IWA Sustainable Wastewater Treatment and Nutrient Recovery*. October 2014, Kathmandu, Nepal.

Delgado-Vela, J., **Martin, K. J.**, Stadler, L. B., Bott, C. B., Skerlos, S. J., Raskin, L., and Love, N. G. (2014) "Nutrient Removal from Mainstream Anaerobic Effluents: Linking Biofilm Modeling to Experimental Design" *WEFTEC.* October 2014, New Orleans, Louisiana. (poster)

Martin, K. J., Derlon, N., Morgenroth, E., and Nerenberg, R. (2013) "Fouling Layer Surface Heterogeneity Improves Permeate Flux" *WEFTEC 2013*, Chicago, Illinois.

Martin, K. J., Picioreanu, C., and Nerenberg, R. (2013) "Multidimensional Modeling of Biofilm Development and Fluid Dynamics in a Hydrogen-Based, Membrane-Supported Biofilm Reactor (MBfR)" *7th IWA Specialised Membrane Technology Conference and Exhibition for Water and Wastewater Treatment and Reuse.* July 2013, Toronto, Ontario, Canada. **Poster Award**

Martin, K. J., Picioreanu, C., and Nerenberg, R. (2013) "Modeling Denitrification, Sulfate-Reduction and Methanogens in a Hydrogen-Based Biofilm Reactor (MBfR)" *IWA Microbial Ecology in Water Engineering Conference.* July 2013, Ann Arbor, Michigan.

Martin, K. J., Picioreanu, C., and Nerenberg, R. (2013) "Modeling Biofilm Development and Fluid Dynamics in a Hydrogen-Based, Membrane-Supported Biofilm Reactor (MBfR)" *IWA Biofilm Reactor Conference.* May 2013, Paris, France.

Martin, K. J., Derlon, N., Morgenroth, E., and Nerenberg, R. (2013) "Fouling Layer Roughness Improves Permeate Flux" *IWA Biofilm Reactor Conference.* May 2013, Paris, France. **Poster Award**

Aybar, M., Pizarro, G., **Martin, K. J.**, Boltz, J. P., Downing, L. S., Nerenberg, R. (2012) "The Air-Based Membrane Biofilm Reactor (MBfR) For Energy Efficient Wastewater Treatment." *WEFTEC*. October 2012, New Orleans, Louisiana.

Martin, K. J., Boltz, J. P., and Nerenberg, R. (2012) "The Membrane Biofilm Reactor (MBfR) for Wastewater Treatment: Applications, Design Considerations, and Technology Outlook." *WEFTEC.* October 2012, New Orleans, Louisiana.

Martin, K. J., Picioreanu, C., and Nerenberg, R. (2011) "Optimizing the Design and Operation of the Hollow-Fiber Membrane Biofilm Reactor Using Multidimensional Biofilm Modeling." *WEFTEC.* October 2011, Los Angeles, California.

Martin, K. J., Boltz, J. P., Keithley, S. E., and Nerenberg, R. (2010) "Guiding the Development of Membrane-Supported Biofilm Processes Through Modelling Studies." *2nd IWA/WEF Wastewater Treatment Modelling Seminar.* March 2010, Mont-Sainte-Anne, Quebec, Canada.

Martin, K. J. and Nerenberg, R. (2009) "Unique Behavior of Counter-Diffusional Biofilms Grown on Hollow-Fiber Membranes." *IWA/WEF Biofilm Processes: Fundamentals to Applications*. September 2009, Davis, California. (poster)

Martin, K. J., Downing, L. S., and Nerenberg, R. (2008) "Evidence of Specialized Bromate-Reducing Bacteria in a Hollow Fiber Membrane Bioreactor." *IWA Leading Edge Technology Conference*. June 2008, Zurich, Switzerland. (poster)

SELECT CONFERENCE ABSTRACTS

Wu, C.C., **Martin, K. J.**, Pinto, A., Love, N. G., Olson, T. M. "Effect of Chlorinated Phenol on Microbial Colonization in Point-of-Use (PoU) Drinking Water Filters and Implications for Antibiotic Resistance" *246th ACS National Meeting*, San Francisco, California.

Martin, K. J., Nerenberg, R. (2012) "Membrane biofilm reactor (MBfR) for wastewater treatment: Principles, applications, and recent developments." *244th ACS National Meeting*. Philadelphia, Pennsylvania, USA.

Downing, L. S., **Martin, K. J.**, and Nerenberg, R. (2009) "The Who, What, and How of Biological Bromate Removal." *AWWA Annual Conference and Exhibition*. June 2009, San Diego, California, USA.

Downing, L. S., **Martin, K. J.**, and Nerenberg, R. (2008) "Comparison of Membrane and Conventional Biofilms for Nitrogen Removal" *WEF: Indiana Water Environment Association Annual Conference.* November 2008, Indianapolis, Indiana, USA.

FELLOWSHIPS AND AWARDS

2013	IWA Membrane 2nd Place Poster Award, Toronto, Ontario, Canada
2013	IWA Biofilm Reactor Conference Poster Award, Paris, France
2012	Kaneb Center for Teaching and Learning "Outstanding Graduate Student Teacher" award
2012	University of Notre Dame Center for Environmental Science and Technology Bayer Fellowship
2011	Indiana Water Environment Association "Besozzi Scholarship"
2011	Geosyntec Student Research Paper Competition, 3rd Place
2010	University of Notre Dame Center for Environmental Science and Technology Bayer Fellowship
2006-2009	University of Notre Dame Diversity Fellow
2008	IWA Young Water Professionals Conference Travel Support

PROFESSIONAL SERVICE AND ACTIVITIES

2010 – present	**Journal Reviewer**, *Environmental Science and Technology, Water Research*
2013	**Session Moderator**, *IWA Biofilm Reactor Conference, Paris, France*
2010	**Young Professional** *on Scientific Committee for WEF/IWA Wastewater Treatment Modeling Conference, Mont-Sainte-Anne, Quebec, Canada.*

UNIVERSITY SERVICE AND LEADERSHIP

2010-2011	**Notre Dame Graduate Student Union,** *academic affairs chair*
2010-2011	**University Library Committee**, *graduate student representative*
2009-2011	**Notre Dame Academic Council**, *student member*
2009	**Notre Dame Provost Review Committee**, *student member*
2008-2010	**Notre Dame Graduate Student Union**, *orientation chair*
2007-2008	**Notre Dame Graduate Student Union**, *departmental representative*

PROFESSIONAL LICENSURE

2006	Engineering in Training, Michigan

PROFESSIONAL ASSOCIATIONS

- International Water Association
- Water Environment Federation
- American Environmental Engineering Society of Professors
- Tau Beta Pi