

# Brooke K. Mayer, Ph.D., P.E.

## EDUCATION

- Arizona State University, Tempe, AZ                      Environmental Engineering                      Ph.D.    2008  
**Mayer, B.K.** 2008. Efficacy of enhanced coagulation & disinfection for treatment of enteric viruses. Ph.D. Dissertation, Arizona State University, Tempe, AZ. [Advisor: Morteza Abbaszadegan]
- Arizona State University, Tempe, AZ                      Environmental Engineering                      M.S.    2006  
**Mayer, B.K.** 2006. Removal of EPA Contaminant Candidate List viruses using enhanced coagulation. M.S. Thesis, Arizona State University, Tempe, AZ. [Advisor: Morteza Abbaszadegan]
- Arizona State University, Tempe, AZ                      Civil and Environmental Engineering                      B.S.    2004  
**Mayer, B.K.** 2004. Cactus Lane Ranch regional commercial center master sewer report. Barrett Honors College B.S. Thesis, Arizona State University, Tempe, AZ.

## PROFESSIONAL EXPERIENCE

- 2012 –Present    Assistant Professor, Civil, Construction and Environmental Engineering, Marquette University, Milwaukee, WI
- 2008 – 2012      Faculty Lecturer, School of Sustainable Engineering and the Built Environment, Arizona State University, Tempe, AZ
- 2006 – 2008      Teaching Assistant, Department of Civil, Environmental, and Sustainable Engineering, Arizona State University, Tempe, AZ
- 2004 – 2008      Research Assistant, Environmental Microbiology Laboratory, Arizona State University, Tempe, AZ
- 2005              Research Scientist Intern, Pacific Northwest National Laboratories, Richland, WA
- 2002 – 2004      Engineering Technician, Carollo Engineers, Phoenix, AZ

## PEER REVIEWED JOURNAL PUBLICATIONS

Dr. Mayer's graduate and undergraduate student research advisees are shown in *italics* (post-doctoral research advisees are shown in **bold italics**). Each article's corresponding author is signified with an asterisk (\*).

1. Esmaeili, B.\*, Parker, P.J., Hart, S.D., **Mayer, B.K.**, Klosky, L., Penn, M.R. 2017. Inclusion of an introduction to infrastructure course in a civil and environmental engineering curriculum. *J. Prof. Issues Ed. Pract.* 143(2), 04016020-1-04016020-8. DOI: 10.1061/(ASCE)EI.1943-5541.0000310.
2. **Yang, Y.**, Shi, X., *Ballent, W.*, **Mayer, B.K.\*** 2017. Biological phosphorus recovery: Current progress and future needs. *Water Environ. Res.* In Press.
3. Carey, D., **Yang, Y.**, McNamara, P.J., **Mayer, B.K.\*** 2016. Recovery of agricultural nutrients from biorefineries. *Bioresour. Technol.* 215, 186-198. DOI: 10.1016/j.biortech.2016.02.093.
4. *Heffron, J.*, *Marhefke, M.*, **Mayer, B.K.\*** 2016. Removal of trace metal contaminants from potable water by electrocoagulation. *Scientific Reports.* 6(28478), 1-9. DOI: 10.1038/srep28478.
5. *Heffron, J.*, **Mayer, B.K.\*** 2016. Emerging Investigator Series: Virus mitigation by coagulation: Recent discoveries and future directions. *Environ. Sci.: Water Res. Technol.* 2(3), 443-459. DOI: 10.1039/C6EW00060F.
6. **Mayer, B.K.\***, Baker, L., Boyer, T.H., Drechsel, P., Gifford, M., Hanjra, M.A., Parameswaran, P., Stoltzfus, J., Westerhoff, P., Rittmann, B.E. 2016. Total value of phosphorus recovery. *Environ. Sci. Technol.* 50, 6606-6620. DOI: 10.1021/acs.est.6b01239.
7. *Tong, Y.*, **Mayer, B.K.**, McNamara, P.J.\* 2016. Triclosan adsorption using wastewater-derived biochar. *Environ. Sci.: Water Res. Technol.* 2, 761-768. DOI: 10.1039/C6EW00127K.

8. **Yang, Y., Ballent, W., Mayer, B.K.\*** 2016. High affinity phosphate binding protein (PBP) for phosphorus recovery: Proof of concept using recombinant *Escherichia coli*. *FEMS Microbiol. Letters*. 363(20), 1-6. DOI: 10.1093/femsle/fnw240.
9. **Mayer, B.K.\***, Daugherty, E., Abbaszadegan, M. 2015. Evaluation of the relationship between bulk organic precursors and disinfection byproduct formation for advanced oxidation processes. *Chemosphere*. 121, 39-46. DOI: 10.1016/j.chemosphere.2014.10.070.
10. **Mayer, B.K.\***, **Yang, Y.**, Gerrity, D.W., Abbaszadegan, M. 2015. The impact of capsid proteins on virus removal and inactivation during water treatment processes. *Microbiol. Insights*. 8(Suppl 2), 15-28. DOI: 10.4137/MBI.S31441.
11. **Williams, A.T.**, Zitomer, D.H., **Mayer, B.K.\*** 2015. Ion exchange-precipitation for nutrient recovery from dilute wastewaters. *Environ. Sci.: Water Res. Technol.* 1, 832-838. DOI: 10.1039/C5EW00142K.
12. **Mayer, B.K.**, Daugherty, E., Abbaszadegan, M.\* 2014. Disinfection byproduct formation resulting from settled, filtered, and finished water treated by titanium dioxide photocatalysis. *Chemosphere*. 117, 72-78. DOI: 10.1016/j.chemosphere.2014.05.073.
13. **Mayer, B.K.\***, Gerrity, D., Rittmann, B.E., Reisinger, D., Brandt-Williams, S. 2013. Innovative strategies to achieve low total phosphorus concentrations in high water flows. *Crit. Rev. Environ. Sci. Technol.* 43(4), 409-441. DOI: 10.1080/10643389.2011.604262.
14. Rittmann, B.E.\* **Mayer, B.K.**, Westerhoff, P., Edwards, M. 2011. Capturing the lost phosphorus. *Chemosphere*. 84, 846-853. DOI: 10.1016/j.chemosphere.2011.02.001.
15. **Mayer, B.K.**, Ryu, H., Gerrity, D., Abbaszadegan, M.\* 2010. Development of an integrated cell culture-qRT-PCR assay for simultaneous quantification of coxsackieviruses, echoviruses, and polioviruses in disinfection studies. *Water Sci. Technol.* 6(2), 375-387. DOI: 10.2166/wst.2010.818.
16. Ryu, H., **Mayer, B.K.**, Abbaszadegan, M.\* 2010. Applicability of quantitative PCR for the determination of removal efficacy of enteric viruses and *Cryptosporidium* by water treatment processes. *J. Water Health*. 8(1), 101-108. DOI: 10.2166/wh.2009.208.
17. Gerrity, D., **Mayer, B.K.**, Ryu, H., Crittenden, J., Abbaszadegan, M.\* 2009. A comparison of pilot-scale photocatalysis and enhanced coagulation for disinfection byproduct mitigation. *Water Res.* 43(6), 1597-1610. DOI: 10.1016/j.watres.2009.01.010.
18. **Mayer, B.K.**, Ryu, H., Abbaszadegan, M.\* 2008. Treatability of USEPA Contaminant Candidate List viruses: removal of coxsackievirus and echovirus using enhanced coagulation. *Environ. Sci. Technol.* 42(18), 6890-6896. DOI: 10.1021/es801481s.
19. Abbaszadegan, M.\* **Mayer, B.K.**, Ryu, H., Nwachuku, N. 2007. Efficacy of removal of CCL viruses under enhanced coagulation conditions. *Environ. Sci. Technol.* 41(3), 971-977. DOI: 10.1021/es061517z.
20. Straub, T.M.\* Höner zu Bentrop, K., Orosz-Coghlan, P., Dohnalkova, A., **Mayer, B.K.**, Bartholomew, R.A., Valdez, C.O., Bruckner-Lea, C.J., Gerba, C.P., Abbaszadegan, M., Nickerson, C.A. 2007. In-vitro cell culture infectivity assay for human noroviruses. *Emerg. Infect. Dis.* 13(3), 396-403. DOI: 10.3201/eid1303.060549.

## PEER REVIEWED CONFERENCE PROCEEDINGS

1. Bosman, L.\* **Mayer, B.K.**, McNamara, P. 2017. Promoting entrepreneurially minded learning through online discussions. *American Society for Engineering Education (ASEE)*. Presented at the Annual Conference, 2017, Columbus, OH, June 25-28, p. 1-10.
2. Kimbell, L., Avila, A., Tong, Y., **Mayer, B.**, McNamara, P.\* 2017. Biosolids reuse: Continuous flow-through column testing of biosolids-derived biochar to sorb micropollutants. *Proceedings of the Water Environment Federation (WEF)*. Presented at the Residuals and Biosolids Conference, Seattle, WA, April 8-11, p. 1-5.
3. **Heffron, J.**, **Mayer B.K.\*** 2016. Factors influencing virus removal by electrocoagulation. *Proceedings of the International Water Association (IWA)*. Presented at the Particle Separation 2016 Conference, Oslo, Norway, June 22-24, p. 1-6.
4. **Tong, Y.**, **Mayer, B.**, McNamara, P.\* 2016. Biosolids as a resource: Using biochar derived from pyrolyzed biosolids to remove trace organic contaminants. *Proceedings of the Water Environment*

*Federation (WEF)*. Presented at the Residuals and Biosolids Conference, Milwaukee, WI, April 4-6, p. 394-397.

5. Marklin, R. Jr.\*, Mathison, M., **Mayer, B.**, Nagurka, M., Cariapa, V., Schabelski, J. 2013. Aquaponics: A sustainable food production system that provides research projects for undergraduate engineering students. *World Engineering Education Forum (WEEF)*. Presented at the Annual Meeting, Cartagena, Columbia, p. 1-8.
6. *Williams, A.T., Mayer, B.\** 2013. Advancements in ion exchange processes for municipal wastewater nutrient recovery. *Water Environment Federation (WEF) Proceedings*. Presented at the WEF Technical Exhibition and Conference, Chicago, IL, p. 6474-6485.
7. Daugherty, E., **Mayer, B.**, Abbaszadegan, M.\* 2011. Analysis of photocatalysis implementation in water treatment systems for the removal of DBP precursors. *American Water Works Association (AWWA)*. Presented at the Water Quality Technology Conference and Exposition 2011, Phoenix, AZ, Nov. 13-17, p. 2516-2528.

Google Scholar Link: <http://scholar.google.com/citations?user=1HrjswAAAAJ>

## EXTERNALLY-FUNDED AWARDS

### \$1.71M in total funding, including \$1.2M as PI

1. Environmental Protection Agency's (EPA's) Water Innovation Network for Sustainable Small Systems (WINSSS) Emerging Technologies Program. Electrocoagulation and electrooxidation to treat microbial and chemical contaminants in small drinking water systems (July 1, 2017 – June 30, 2018), PI: **Mayer, B.**, Co-PI: McNamara, P., Co-PI: Young, K., \$50k.
2. National Science Foundation (NSF). RAPID: Waterborne *Elizabethkingia* disinfection studies in response to ongoing U.S. outbreak, (Jan. 1, 2017 – Dec. 31, 2017), PI: **Mayer, B.**, Co-PI: Young, K., \$49,928.
3. NSF Water Equipment & Policy (WEP) Industry/University Collaborative Research Center (I/UCRC). Ultra-low phosphorus regulations: Improving removal of non-reactive phosphorus and downstream dewaterability in bio-P biosolids, (Jan. 1, 2017 – Dec. 31, 2017), PI: McNamara, P., Co-PI: **Mayer, B.**, \$47,383.
4. Lafferty Family Foundation. Novel electro-treatment for the mitigation of endocrine disrupting compounds and viruses in drinking water (Jan. 1, 2017 – Dec. 31, 2017), PI: **Mayer, B.**, PI: McNamara, P., \$50k.
5. National Science Foundation (NSF) CAREER Award. CAREER: Harnessing the power of the phosphate-binding protein PstS to recover phosphorus (Aug. 1, 2016 – July 31, 2021), PI: **Mayer, B.**, \$500k.
6. NSF CAREER Award Supplement to collaborate with European Research Council (ERC)-funded team's Synergy Grant on "Imbalance P" (Summer 2017), PI: **Mayer, B.**, \$4,530 [\$3k direct costs].
7. Lafferty Family Foundation. Improving water reuse: Capturing the good and removing the bad (2015 – 2016), PI: McNamara, P., Co-PI: **Mayer, B.**, \$50k.
8. Milwaukee Metropolitan Sewerage District (MMSD). Ion exchange nutrient recovery to customize nutrient content of Milorganite (June 1, 2015 – June 30, 2016), PI: **Mayer, B.**, Co-PI, McNamara, P., \$93,313.
9. NSF: Fundamental Research Program (FRP) through Industry/University Collaborative Research Center (I/UCRC): Water Equipment & Policy (WEP). Electrocoagulation for the mitigation of emerging biological and chemical contaminants (Jan. 1, 2015 – June 30, 2017), PI: **Mayer, B.**, Co-PI: McNamara, P., Co-PI: Zitomer, D., \$199,680.
10. NSF: Collaborative Opportunity for Research Between Industry/University Collaborative Research Center (I/UCRCs) (CORBI) through I/UCRC: Water Equipment & Policy (WEP)/Water & Environmental Technology (WET). Coupled titanium dioxide photocatalysis and filtration for simultaneous mitigation of organic matter, viruses, and estrogenic compounds (Jan. 1, 2015 – Dec. 31,

- 2016), PI: **Mayer, B.**, PI: Abbaszadegan, M., Co-PI: McNamara, P., Co-PI: Zitomer, D., total \$200k (\$100k at MU).
11. NSF Water Equipment & Policy (WEP) Industry/University Collaborative Research Center (IUCRC). Using pyrolysis product biochar to capture micropollutants (Jan. 1, 2015 – Dec. 31, 2015), PI: McNamara, P., Co-PI, **Mayer, B.**, \$50k.
  12. NSF Water Equipment & Policy (WEP) Industry/University Collaborative Research Center (IUCRC). Advanced high-rate wet-weather treatment processes (Jan. 1, 2015 – Dec. 31, 2015), PI: Zitomer, D., Co-PI: **Mayer, B.**, Co-PI: McNamara, P., \$50k; 2<sup>nd</sup> phase awarded in 2016 (Jan. 1, 2016 – Dec. 31, 2016) for additional \$50k [total \$100k].
  13. NSF Water Equipment & Policy (WEP) Industry/University Collaborative Research Center (IUCRC). Evaluation of electrocoagulation-microfiltration for the removal of trace heavy metals, hardness, and viruses (2013 – 2014), PI: **Mayer, B.**, \$50k.
  14. Industry-Sponsored Research Grant: Xylem, Inc. Sustainable treatment system for municipal anaerobic wastewater treatment (2012 – 2014), PI: Zitomer, D., Co-PI: **Mayer, B.**, \$260,076.

## STUDENT/POST-DOC RESEARCH ADVISING

### A. Ph.D. and M.S. Students Graduated

1. Yizhi (Jonathan) Hou (Sum17): An improved method of arsenic(III) removal by reverse osmosis membrane. Currently: A.O. Smith
2. Joseph Heffron (S15): Removal of trace heavy metals from drinking water by electrocoagulation. Currently: Marquette University Ph.D. student
3. Patrick Mullen (S15): Nutrient recovery from anaerobic membrane bioreactor permeate using ion exchange. Currently: CNP Biosolids
4. Allen Williams (F13): Ion exchange for nutrient removal in municipal wastewater with subsequent beneficial recovery of ammonium and phosphate. Currently: Donahue and Associates

### B. Post-docs Advised

1. Kaushik Venkiteshwaran (F16 – Anticipated S18): Phosphate recovery using high-affinity proteins
2. Yu Yang (2015): Recovery of phosphate from wastewater using bioengineered high-affinity phosphate binding protein systems. Currently: North American Hoganas

## HONORS AND AWARDS

- Way Klinger Young Scholar Award (2017 – 2018), associated with S18 sabbatical performed at Arizona State University
- Nelson Faculty Scholar: endowed position (2015 – present), associated with yearly stipend to support discretionary costs
- Arizona State University College of Engineering Teaching award: Ranked in top 5% of engineering professors based on student evaluations (F09 – S10, F10 – S11)
- Faculty Advisor of the Year, Engineering Projects in Community Service (EPICS) at Arizona State University (2011)
- Department of Homeland Security Fellow (2004 – 2007)
- Chi Epsilon Civil Engineering Honor Society (2003 – present)
- Tau Beta Pi National Engineering Honor Society (2002 – present)
- National Merit Scholar (2000 – 2004)