

Krista Rule Wigginton

1. Personal Information

a. Education Background

- Ph.D., Environmental Engineering, Virginia Tech, Blacksburg, VA (2008)
- MS, Environmental Engineering, Virginia Tech, Blacksburg, VA (2004)
- BS, Professional Chemistry, University of Idaho, Moscow, ID (2001)

b. Employment Background

- Associate Professor of Environmental Engineering in the Department of Civil and Environmental Engineering, University of Michigan, September (2019 - present)
- Shimizu Visiting Professor, Department of Civil and Environmental Engineering, Stanford University (2019 - 2020)
- Assistant Professor of Environmental Engineering in the Department of Civil and Environmental Engineering, University of Michigan (2013 - 2019)
- Pedro E. Wasmer Assistant Professor of Environmental Engineering in the Department of Civil and Environmental Engineering, University of Maryland (2011 - 2012)
- Postdoctoral Researcher, Ecole Polytechnique Federale de Lausanne, Switzerland (2008 - 2010)

2. Research, Scholarly & Creative Activities

a. Preprints and submitted manuscripts

1. **Wigginton, K. R.**, Arts, P.J., Clack, H., Fitzsimmons, W.J., Gamba, M., Harrison, K.R., LeBar, W., Luring, A.S., Li, L., Roberts, W.W., Rockey, N., Torreblanca, J., Young, C., Anderegg, L.C., Cohn, A., Doyle, J.M., Meisenhelder, C.O., Raskin, L., Love, N.G., and Kaye, K.S. (2020) Validation of N95 filtering facepiece respirator decontamination methods available at a large university hospital. medRxiv Preprint 10.1101/2020.04.28.20084038.
2. Croisette, E. M., Gumm, J., Langenfeld, K., Raskin, L., Duhaime, M., **Wigginton, K. R.**, (2020) Enhancing metagenomic quantification of genes in environmental samples with internal standards, under review.

b. Articles in refereed journals

1. Bivens, A., North, D., Ahmad, A. Ahmed, W., Alm, E., Béen, F., Bhattacharya, P., Bijlsma, L., Boehm, A., Brown, J., Buttiglieri, G., Calabró, V., Carducci, A., Castiglioni, S., Cetecioglu, Z., Charkraborty, S., Costa, F., de los Reyes III, F., Delgado Vela, J., Farkas, K., Fernandez C. X.; Gerba, C., Gerrity, D., Girones, R., Gonzalez, R., Haramoto, E., Harris, A., Holden, P., Islam, M. T., Jones, D.,

- Kasprzyk-Hordern, B., Kitajima, M., Kotlarz, N., Kumar, M., Kuroda, K., La Rosa, G., Malpei, F., Matus, M., McLellan, S., Medema, G., Meschke, J. S., Mueller, J., Newton, R., Nilsson, D., Noble, R., van Nuijs, A., Peccia, J., Perkins, A., Pickering, A., Rose, J., Sánchez, G., Smith, A., Stadler, L., Stauber, C., Thomas, K., van der Voorn, T., **Wigginton, K.R.**, Zhu, K., Bibby, K. (2020) Wastewater-Based Epidemiology: Global Collaborative to Maximize Contributions in the Fight Against COVID-19, *Environmental Science & Technology*, in press.
2. **Wigginton, K. R.**, and Boehm, A. A. (2020) Environmental Engineers and Scientists Have Important Roles to Play in Stemming Outbreaks and Pandemics Caused by Enveloped Viruses. *Environmental Science & Technology*, 54(7), 3736–3739.
 3. Petrovich, M.L., Zilberman, A., Kaplan, A., Eliraz, G.R., Wang, Y., Langenfeld, K., Duhaime, M., **Wigginton, K. R.**, Poretsky, R., Avisar D., and Wells, G.F. (2020) Microbial and Viral Communities and Their Antibiotic Resistance Genes Throughout a Hospital Wastewater Treatment System. *Frontiers in Microbiology*, 11, 153.
 4. Rockey, N., Young, S., Kohn, T., Pecson, B., Wobus, C.E., Raskin, L., and **Wigginton, K. R.** (2020) UV Disinfection of Human Norovirus: Evaluating Infectivity Using a Genome-Wide PCR-Based Approach. *Environmental Science & Technology*, 54(5), 2851–2858.
 5. Goetsch, H.E., Love, N., and **Wigginton, K. R.** (2020). Fate of Extracellular DNA in the Production of Fertilizers from Source-Separated Urine. *Environmental Science & Technology*, 54(3), 1808-1815.
 6. Ye, Y., Zhao, L., Imperiale, M. J., and **Wigginton, K. R.** (2019). Integrated Cell Culture-Mass Spectrometry Method for Infectious Human Virus Monitoring. *Environmental Science & Technology Letters*, 6(7), 407-412.
 7. Xia, T., Kleinheksel, A., Lee, E. M., Qiao, Z., and **Wigginton, K. R.**, & Clack, H. L. (2019). Inactivation of airborne viruses using a packed bed non-thermal plasma reactor. *Journal of Physics D: Applied Physics*, 52(25), 255201.
 8. Rockey, N., Bischel, H. N., Kohn, T., Pecson, B., and **Wigginton, K. R.** (2019). The utility of flow cytometry for potable reuse. *Current Opinion in Biotechnology*, 57, 42-49.
 9. Hurst, J. J., Oliver, J.P., Schueler, J., Gooch, C. Lansing, S., Crossette, E., **Wigginton, K. R.**, Raskin, L., Aga, D.S., and Sassoubre, L.M. (2019) Trends in Antimicrobial Resistance Genes in Manure Blend Pits and Long-Term Storage Across Dairy Farms with Comparisons to Antimicrobial Usage and Residual Concentrations. *Environmental Science & Technology*, 53(5), 2405-2415.
 10. Qiao, Z., Ye, Y., Chang, P. H., Thirunarayanan, D., and **Wigginton, K. R.** (2018). Nucleic Acid Photolysis by UV₂₅₄ and the Impact of Virus Encapsidation. *Environmental Science & Technology*, 52(18), 10408-10415.
 11. Ye, Y., Chang, P. H., Hartert, J., and **Wigginton, K. R.** (2018). Reactivity of

- enveloped virus genome, proteins, and lipids with free chlorine and UV254. *Environmental Science & Technology*, 52(14), 7698-7708.
12. Nelson, K. L. Boehm, A. B., Davies-Colley, R.J., Dodd, M. C., Kohn, T., Linden, K. G., Liu, Y., Maraccini, P. A., McNeill, K., Mitch, W. A., Nguyen, T. H., Parker, K. M., Rodriguez, R. A., Sassoubre, L. M., Silverman, A. I., **Wigginton, K. R.**, and Zepp, R. G., (2018) Sunlight-mediated inactivation of health-relevant microorganisms in water: a review of mechanisms and modeling approaches. *Environmental Science: Processes & Impacts*, 20(8), 1089-1122.
 13. Pruden, A., Alcalde, R., Alvarez, Pl, Asholt, N., Bischel, H., Capiro, N., Crossette, E., Frigon, D., Grimes, K., Hass, C., Ikuma, K., Kappeli, A., Lapara, T., Seo, L., Sobsey, M., Sozzi, E., Navab-Daneschmand, Raskin, L., Riquelme, M., Vikesland, V., **Wigginton, K. R.**, and Zhou, Z., (2018). An Environmental Science and Engineering Framework for Combating Antimicrobial Resistance, *Environmental Engineering Science*, 35(10), 1005-1011.
 14. Goetsch, H.E., Zhao, L., Gnegy, M., Imperiale, M.J., Love, N.G. and **Wigginton, K. R.**, (2018). Fate of the Urinary Tract Virus BK Human Polyomavirus in Source-Separated Urine. *Applied and Environmental Microbiology*, 84(7), e02374-17.
 15. Vikesland, P.J., Pruden, A., Alvarez, P.J., Aga, D.S., Buergermann, H., Li, X., Manaia, C.M., Nambi, I.M., **Wigginton, K. R.**, Zhang, T. and Zhu, Y.G., (2017). Towards a Comprehensive Strategy to Mitigate Dissemination of Environmental Sources of Antibiotic Resistance. *Environmental Science & Technology*, 51(22), 13061-13069.
 16. Mullen, R. A., **Wigginton, K. R.**, Noe-Hays, A., Nace, K., Love, N. G., Bott, C. B., and Aga, D. S. (2017). Optimizing extraction and analysis of pharmaceuticals in human urine, struvite, food crops, soil, and lysimeter water by liquid chromatography-tandem mass spectrometry. *Analytical Methods* 9(41), 5952-5962.
 17. Chang, P. H., Juhrend, B., Olson, T. M., Marrs, C. F., & **Wigginton, K. R.** (2017). Degradation of extracellular antibiotic resistance genes with UV254 treatment. *Environmental Science & Technology*, 51(11), 6185–6192.
 18. Cable, R. N., Beletsky, D., Beletsky, R., **Wigginton, K. R.**, Locke, B. W., & Duhaime, M. B. (2017). Distribution and Modeled Transport of Plastic Pollution in the Great Lakes, the World's Largest Freshwater Resource. *Frontiers in Environmental Science*, 5, 45-54.
 19. Bibby, K., Aquino de Carvalho, N., and **Wigginton, K. R.** (2017) Research Needs for Wastewater Handling in Virus Outbreak Response. *Environmental Science & Technology*, 51(5) 2534-2535.
 20. Ye, Y., Ellenberg, M., Graham, K, and **Wigginton K. R.** (2016) Survivability, partitioning, and recovery of enveloped viruses in untreated municipal wastewater. *Environmental Science & Technology*, 50(10), 5077-5085.
 21. Lahr, R., Goetsch, H., Haig, S. Noe-Hays, A., Love, N., Aga, D., Bott, C., and

- Wigginton, K. R.** (2016) Urine Bacterial Community Convergence through Fertilizer Production: Storage, Pasteurization, and Struvite Precipitation. *Environmental Science & Technology*, 50(21), 11619-11626.
22. Qiao, Z., and **Wigginton, K. R.** (2016) Direct and Indirect Photochemical Reactions in Viral RNA Measured with RT-qPCR and Mass Spectrometry. *Environmental Science & Technology*, 50(24), 13371-13379.
23. **Wigginton, K. R.**, Ye, Y., and Ellenberg, M. (2015) Emerging Investigators Series: The source and fate of pandemic viruses in the urban water cycle, *Environmental Science: Water Science and Technology*, 1(6), 735-746.
24. Donham, J., Rosenfeldt, E., and **Wigginton, K. R.**, (2014) Photometric hydroxyl radical scavenging analysis of standard natural organic matter isolates, *Environmental Science: Processes and Impacts*, 16, 764-769.
25. Sigstam, T, Gannon, G., Cascella, M., Pecson, B., **Wigginton, K. R.**, and Kohn, T. (2013) Subtle differences in virus composition affect disinfection kinetics and mechanisms. *Applied and Environmental Microbiology*, 79(11), 3455-3467.
26. Vikesland, P.V., Fiss, E.M., **Wigginton, K. R.**, McNeill, K., and Arnold, W.A. (2013) Halogenation of Bisphenol-A, Triclosan, and Chlorophenols in Chlorinated Waters Containing Iodide. *Environmental Science & Technology*, 47(13), 6764-6772.
27. **Wigginton, K. R.**, Pecson, B.M., Sigstam, T., Bosshard, F., and Kohn, T. (2012) Virus inactivation mechanisms: impact of disinfectants on virus function and structural integrity, *Environmental Science & Technology*, 46(21), 12069-12078.
28. **Wigginton, K. R.**, Menin, L., Sigstam, T., Gannon, G., Cascella, M., Hamidane, H.B., Tsybin, Y.O., Waridel, P., and Kohn, T. (2012) UV radiation induces genome-mediated, site-specific cleavage in viral protein, *ChemBioChem*, 13(6), 837-845.
29. **Wigginton, K. R.**, and Kohn, T. Virus disinfection mechanisms: the role of virus composition, structure, and function, (2012), *Current Opinion in Virology*, 2(1), 84-89.
30. Mattle, M.J., Crouzy, B., Brennecke M., **Wigginton, K. R.**, Perona, P., and Kohn, T. (2011). Impact of virus aggregation on inactivation by peracetic acid and implications for other disinfectants. *Environmental Science and Technology*, 45(18), 7710-7717.
31. **Wigginton, K. R.**, Menin, L., Montoya, J.P., and Kohn, T. (2010) Oxidation of virus proteins during UV₂₅₄ and singlet oxygen mediated inactivation. *Environmental Science and Technology*, 44(14), 5437-5443.
32. Vikesland, P.J., and **Wigginton, K. R.** (2010) Nanomaterial enabled biosensors for pathogen monitoring – a review. *Environmental Science and Technology*, 44(10), 3656-3669.
33. **Wigginton, K. R.**, and Vikesland, P.J. (2010) Gold-coated polycarbonate membrane filter for pathogen concentration and SERS-based detection. *The*

Analyst, 135(6), 1320-1326.

34. **Rule, K. L.**, and Vikesland, P.J. (2009) Surface-enhanced resonance Raman spectroscopy for the rapid detection of *Cryptosporidium parvum* and *Giardia lamblia*, *Environmental Science and Technology*, 43(4), 1147-1152.
35. Fiss, M.E., **Rule, K. L.**, and Vikesland, P.J. (2007) Formation of chloroform and other chlorinated byproducts by chlorination of Triclosan-containing antibacterial products. *Environmental Science and Technology*, 41(7), 2387-2394.
36. **Rule, K. L.**, Ebbett, V.R., and Vikesland, P.J., (2005). Formation of chloroform and chlorinated organics by free-chlorine mediated oxidation of Triclosan. *Environmental Science and Technology*, 39(9), 3176-3185.
37. **Rule, K. L.**, Selvaraj, I.I., and Kirchmeier, R.L. (2001). Synthesis and characterization of per/polyfluorophenoxy derivatives of octachlorocyclo-tetraphosphazenes. *Journal of Fluorine Chemistry*, 112(2), 307-312 Sp. Iss.

c. Talks, Abstracts, and Other Professional Papers Presented

i. Invited Talks

1. Wigginton, K.R., June 2020 (cancelled due to COVID-19) "Tracking viruses through the urban water cycle," Gordon Research Conference Environmental Sciences: Water, Holderness, NH.
2. Wigginton, K.R., June 2020 (cancelled due to COVID-19), "Viruses in sewage and their potential roles in the transfer of antimicrobial resistance," American Society of Microbiology Annual Conference, Chicago, IL.
3. Wigginton, K.R., April 2020, "Virus loads in human samples and using predictive models to predict fate in the environment," in Water Research Foundation Webcast titled Latest Coronavirus Research Update.
4. Wigginton, K.R., February 2020, "Advanced methods for virus detection in potable reuse," International Symposium on Water Reuse, Atlanta, GA.
5. Wigginton, K.R., January 2020, "Recent advancements in environmental virus fate and detection," USC CEE Departmental Seminar.
6. Wigginton, K.R., October 2019, "Recent advances in environmental virology," Stanford Environmental Engineering Seminar Series.
7. Wigginton, K.R., September 2019, "Recent advances in environmental virology," UC Davis Civil and Environmental Engineering Departmental Seminar.
8. Wigginton, K.R., Ye, Y., August 2019, "Integrated cell culture-mass spectrometry method for monitoring infectious human viruses in environmental samples," ACS Annual Fall Meeting, San Diego, CA.
9. Wigginton, K.R., Qiao, Z., August 2019, "Nucleic acid reactivity with UV radiation and HOCl and the impact of virus capsids," ACS Annual Fall Meeting, San Diego, CA.
10. Wigginton, K.R., July 2019, "Virus disinfection: how to kill the nonliving,"

- Gordon Research Conference: Water Disinfection, Byproducts and Health, South Hadley, MA.
11. Wigginton, K.R., June 2019, “The challenges and future of environmental virus monitoring” Association of Public Health Laboratories Annual Meeting, St. Louis, MO.
 12. Wigginton, K.R., June 2019, “Recent advances in environmental virology”, Plenary presentation at UNC Water Microbiology, Chapel Hill, NC.
 13. Wigginton, K.R., May 2019, “How virus particle structures control their persistence in the environment,” Alfred P. Sloan Workshop on Viruses in the Built Environment, Alexandria, VA.
 14. Wigginton, K.R., February 2019, “How virus particle structures control their persistence in the environment,” Texas A&M Department of Civil and Environmental Engineering Seminar,.
 15. Wigginton, K.R., December 2018, “Plagued by viruses: how to detect the unculturable and kill the nonliving,” MIT Department of Civil and Environmental Engineering Parsons Seminar.
 16. Wigginton, K.R., November 2018, “Plagued by viruses: how to detect the unculturable and kill the nonliving,” Duke Department of Civil and Environmental Engineering, November 2018.
 17. Wigginton, K.R., July 2018, “Small but fierce: How virus particle structures control their persistence in the environment”, Gordon Research Conference on Microbiology of the Built Environment, Portland, ME.
 18. Wigginton, K.R. March 2018, “Nucleic acid reactivity and functional fate in water treatment processes,” American Chemical Society annual conference, New Orleans.
 19. Wigginton, K., October 2017, “Biomolecule pollutants and their fate in water treatment processes”, CEE departmental seminar at CU Boulder, October, 2017.
 20. Wigginton, K.R., October 2017, “Biomolecule pollutants and their fate in water treatment processes,” University of Colorado Department of Civil and Environmental Engineering Seminar.
 21. Wigginton, K.R., January 2017, “Biomolecule pollutants and their fate in water treatment processes,” Stanford University Department of Civil and Environmental Engineering Seminar.
 22. Wigginton, K.R., January 2017, “The fate of biomolecule pollutants in water treatment processes,” Seminar for UC Berkeley Environmental Engineering program.
 23. Wigginton, K.R., May 2016, “The Role of Environmental Engineering and Science in Pandemic Preparedness.” NSF-AEESP Grand Challenges Workshop, Arlington, VA.
 24. Wigginton, K.R. May 2016, “Fate of enveloped and non-enveloped surrogate

- viruses in WW treatment”, NSF Workshop on Ebola Preparedness, Arlington, VA.
25. Wigginton, K.R., December 2016, “Systems View of Nutrient Management – Nutrient Recovery from Human Urine.” EPA SSWR Water Research Seminar.
 26. Wigginton, K.R., September 2016, “Viruses in the urban water cycle” Indian Institute of Sciences (IISc), Chemistry Departmental Seminar, Bangalore, India.
 27. Wigginton, K.R., May 2016, “Emerging Contaminant Studies in Environmental Biotechnology Using High Resolution LC-MS,” Thermo Webinar Series on the Analysis of Emerging Contaminants.
 28. Wigginton, K., November 2015, “Viruses in the urban water cycle,” Civil and Environmental Engineering Department Seminar Series, University of Iowa, Iowa City, IA.
 29. Wigginton, K., March 2015, “The Fate of Emerging Biochemical Contaminants in Wastewater Disinfecting Treatments,” Pittcon Conference, New Orleans.
 30. Wigginton, K. November 2014, “Biological and Chemical Fate of Viruses in Water Treatment Processes”, Civil and Environmental Engineering Department Seminar, University of Pittsburgh, Pittsburgh PA.
 31. Wigginton, K.R., March 2014, “A closer look at waterborne viruses”, Civil and Environmental Engineering Department Seminar, Syracuse University, Syracuse, NY.
 32. Wigginton, K.R., January 2014, “The presence and fate of viruses in drinking water and wastewater treatment,” Environmental and Water Resources Program Seminar, Virginia Tech, Blacksburg, VA.
 33. Wigginton, K.R., October 2013, “A closer look at waterborne viruses,” Women in Science & Engineering Leadership Institute Lecture for Environmental Chemistry & Toxicology Program, University of Wisconsin, Madison, WI.
 34. Wigginton, K.R., April 2013, “Routes to Protein Damage with UVC”, ReNUWit Workshop on Sunlight Degradation of Biomolecules and Microorganisms, Stanford, CA.
 35. Wigginton, K.R., December 2011, “How to “kill” a virus: degradation of viral components during disinfection,” Metrology of Microbial Systems Seminar, National Institute of Standards and Technology, Gaithersburg, MD.
 36. Wigginton, K.R., September 2011, “How to “kill” a virus: mechanisms of virus inactivation with heat, UV, and chemical oxidants,” Department of Geography and Environmental Engineering M. Gordon Wolman Seminar, The Johns Hopkins University, Baltimore, MD.
 37. Wigginton, K.R., April 2011, “Virus Inactivation Mechanisms Upon Exposure to Heat, Oxidants, and UV-irradiation,” Department of Environmental Engineering and Earth Sciences, Clemson University, Anderson, SC.
 38. Wigginton, K.R., November 2008, "A nanotechnology-enabled strategy for

waterborne pathogen detection,” Department of Civil and Environmental Engineering, University of Michigan, Ann Arbor, MI.

ii. Refereed conference proceedings (all oral presentations)

1. Wigginton, K.R., “The Status of Virus Detection Methods for Water Reuse Applications,” San Diego, CA, September 2019.
2. Langenfeld, K. Duhaime, M., Wigginton, K., “Quantitative Viral Metagenomic Method Combining Long and Short Read Sequencing,” IWA Health Related Microbiology Conference, Vienna, September 2019.
3. Rockey, N., Young, S., Pecson, B., Wobus, C., Raskin, L., Kohn, T., Wigginton, K., “Estimating the Infectivity of Human Norovirus and Other Single-Stranded RNA Viruses through Low Pressure UV Disinfection,” IWA Health Related Microbiology Conference, Vienna, September 2019.
4. Wigginton, K.R., “Virus Detection Methods for Water Reuse Applications,” 12th IWA International Conference on Water Reclamation and Reuse, Berlin, June 2019.
5. Crossette, E., Gumm, J., Duhaime, M., Raskin, L., Wigginton, K.R., “A Metagenomic Tool for Absolute Quantification of Resistance Genes,” Chapel Hill, NC, May 2019.
6. Rockey, N., Wigginton, K.R., “Near Real-Time Monitoring of Virus Particles with Flow Virometry in Water Reuse Applications,” AEESP Education and Research Conference, Tempe AZ, May 2019.
7. Ye, Y., Zhao, L., Imperiale, M. Wigginton, K.R., “Mass Spectrometry Method for Monitoring Infectious Human Viruses in Environmental Samples,” AEESP Education and Research Conference, Tempe AZ, May 2019.
8. Rockey, N., Young, S., Kohn, K., Pecson, B., Wobus, C., Raskin, L., Wigginton, K.R., Infectivity of Human Norovirus Through Water Reuse Disinfection Processes, The Water Research Foundation Conference, Atlanta GA, May 2018.
9. Langenfeld, K., R. Cable, M. Duhaime, K. Wigginton “Comparison of virus concentration methods from various water matrices for detecting the viral resistome”, ACS National Meeting, New Orleans LA, March 2018.
10. Qiao, Z., P. Chang, K. Wigginton, “Impact of higher order nucleic acid structure on reactivity with UV254”, ACS National Meeting, New Orleans, March 2018.
11. Ye, Y., K. Wigginton “Enveloped virus inactivation by UV and chlorine disinfection,” ACS National Meeting, New Orleans, March 2018.
12. Tarpeh, W., D.S. Aga, K. Wigginton, N. Love, “Assessing risks from pharmaceuticals and transformation products in urine-derived fertilizers”, ACS National Meeting, New Orleans, March 2018.
13. Rockey, N., Kohn, K., Pecson, B., Wobus, C., Raskin, L., Wigginton, K.R., Infectivity of Human Norovirus Through Water Reuse Disinfection Processes, AWWA Potable Reuse Conference, Austin, TX., January 2018.

14. Ye, Y., Wigginton, K., “Model enveloped virus inactivation by free chlorine,” 2017 Water Microbiology Conference and the 19th IWA-HRWM Symposium, Chapel Hill, N.C., May 2017.
15. Goetsch, H. ; N. G. Love; M. Imperiale; K. Wigginton, “Fate of human BK polyomavirus through urine diverted for fertilizer use”, International Resource Recovery Conference 2017, New York City, August, 2017.
16. Qiao, Z. D. Thirunarayanan; K. R. Wigginton, “Reactions in viral RNA during water disinfection treatments”, 2017 AEESP Research and Education Conference, June 2017.
17. H. Goetsch ; N. G. Love; M. Imperiale; K. Wigginton, “Fate of human BK polyomavirus through urine diverted for fertilizer use”, 2017 AEESP Research and Education Conference, June 2017.
18. Rockey, N., Kohn, K., Wobus, C., Wigginton, K. “Infectivity of Human Norovirus through Water Reuse Disinfection Processes” IWA International Symposium on Health-Related Water Microbiology, Chapel Hill, NC, May 2017.
19. Goetsch, H., Wigginton, K., Love N., Mullen, R., Gagnon, A., Lahr, R., Felek, A., Aga, D., Bott, C., Jimenez, J., Nace, K., Noe-Hays, A., “Nutrient Recovery through Development of Urine-derived Fertilizers: Fate of Trace Contaminants”, Borchardt Conference, Ann Arbor, MI, February 2017.
20. Qiao, Zhong, K.R., Wigginton, “Direct and indirect photochemical reactions in viral RNA measured with RT-qPCR and mass spectrometry”, ACS National Conference, San Francisco, CA, April 2016.
21. Goetsch, H., Love, M., Imperiale, M., Wigginton, K., “Fate of human BK polyomavirus through urine diverted for fertilizer,” ACS National Conference, San Francisco, CA, April 2017.
22. Ye, Yinyin, Wigginton, K. “Fate and Recovery of Enveloped Viruses in Municipal Wastewater” Water Microbiology Conference 2016, Chapel Hill, N.C., May 2016.
23. Wigginton, K.R., Ye, Y., “Comparisons of the behavior of enveloped and non-enveloped viruses in wastewater treatment” International Society of Food and Environmental Virology Conference, Kusatsu, Japan, September 2016.
24. Rockey, N., Yonts, J., Haig, S., Wigginton, K., Raskin, L., “Characterizing Opportunistic Bacterial Pathogens in a Domestic Hot Water Pipe Loop System ,” AWWA WQTC Conference, Indianapolis, IN, November 2016.
25. K.R. Wigginton, Z. Qiao, “Implications of PCR techniques for measuring the fate of viruses and ARGs in UV-treated waters,” Pacifichem, December 2015.
26. Jeyaratnam, J., Wigginton, K., “Bacteriophage-assisted ARG Transfer Within Drinking Water Distribution Systems,” WQTC, November 2015.
27. Wigginton, K.R., “The presence and fate of enveloped viruses in municipal wastewater treatment,” IWA International Symposium on Health-Related Water Microbiology, September 2015.

28. Goetsch, H. Mullen, R., Lahr, R., Noe-Hays, A., Aga, D., Bott, C., Foxman, B. Jimenez, J., Love, N., Luo, T., Nace, K., Ramadugu, Wigginton, K., "Fate of pharmaceutical and biological contaminants through the preparation and application of urine derived fertilizers," WEFTEC Annual Conference, September 2015.
29. Goetsch, H. Mullen, R., Lahr, R., Noe-Hays, A., Aga, D., Bott, C., Foxman, B. Jimenez, J., Love, N., Luo, T., Nace, K., Ramadugu, Wigginton, K., "The Fate of pharmaceutical and biological contaminants through the preparation and application of urine derived fertilizers," IWA Resource Recovery Conference, Gent, August 2015.
30. Ye, Y., Wigginton, K., "Methods for the Detection of Infective Enveloped Viruses in Municipal Wastewater", ACS National Fall Conference, Boston, August 2015.
31. Wigginton, K., Ye, Y., "The implications of a virus pandemic on wastewater and drinking water treatment", AEESP Conference, New Haven, June 2015.
32. Qiao, Z., Wigginton, K., "Examination of Reactions in Viral RNA During UV Disinfection With RT-QPCR and Mass Spectrometry," AWWA ACE 2015, Anaheim, June 2015.
33. Wigginton, K., Qiao, Z., "Chemical Fate of Nucleic Acids During Disinfecting Treatments," International Symposium on Waterborne Pathogens Program, Savannah, April 2015.
34. Wigginton, K., "Nucleic Acid Pollutant Fate in Disinfecting Treatments," 2014 Borchardt Conference, Ann Arbor, February 2014.
35. Donham, J., Rosenfeldt, E., Wigginton, K., "Analysis of $k_{\text{NOM-OH}}$ for NOM isolates and drinking water samples with rapid background scavenging technique," ACS National Spring Meeting, New Orleans, April 2013.
36. Donham, J., Rosenfeldt, E., Wigginton, K., "Variability of Background Hydroxyl Radical Scavenging in Drinking Water," IUVA 2012 Americas Conference, August, 2012.
37. Wigginton, K.R., Pecson, B.M, Sigstam, T., Bosshard, F., Kohn, T., August 2011, "Virus inactivation upon exposure to heat, oxidants, and UV irradiation," American Chemical Society Fall Meeting, Denver, CO.
38. Wigginton, K.R., Kohn, T., Pecson, B., Sigstam, T., Bosshard, F., July 2011, "Quantitative Assessment of virus protein and genome damage upon inactivation by common disinfectants," AEESP Education and Research Conference, Tampa, FL.
39. Wigginton, K.R., Kohn, T., Pecson, B., Sigstam, T., Bosshard, F., May 2011, "The Mechanisms Responsible for Virus Inactivation Upon Exposure to Oxidants, Germicidal UV, and Heat," American Society for Microbiology General Meeting, New Orleans, LA.
40. Wigginton, K.R., October 2010, "The kinetics and products of virus protein

degradation during water disinfection,” COST-929 Symposium, Istanbul, Turkey.

41. Wigginton, K.R., Pecson, B.M, Kohn, T., March 2010, “Virus oxidation in sunlit waters,” American Chemical Society Spring Meeting, San Francisco, CA.
42. Wigginton, K.R., Vikesland, P.J., August 2008, "A nanotechnology enabled detection method for *Cryptosporidium parvum* and *Giardia lamblia*," American Chemical Society Fall Meeting, Philadelphia, PA.
43. Rule, K.L., Vikesland, P.J., April 2008, "SERS-based method for pathogen monitoring in drinking water," American Chemical Society Spring Meeting, New Orleans, LA.
44. Rule, K.L., Rectanus, H.V., Vikesland, P.J., July 2007, "Development of a SERS immunoassay for the detection of *Cryptosporidium* in drinking waters," American Water Works Association Annual Conference and Exposition, Toronto, Canada.
45. Rule, K.L., Rectanus, H.V., Vikesland, P.J., March 2007, "A SERS based immunoassay for the detection of *Cryptosporidium parvum* in drinking water," American Chemical Society Spring Meeting, Chicago, IL.
46. Rule, K.L., Vikesland, P.J., November 2006, "The development of an immunoassay for the detection of *Cryptosporidium parvum* in drinking waters," AIChE Annual Meeting, San Francisco, CA.
47. Rule, K.L., Greyshock, A.E., Vikesland, P.J., August 2004, “The mechanisms, kinetics, and products Of Triclosan-disinfectant reactions,” American Chemical Society Fall Meeting, Philadelphia, PA.
48. Rule, K.L., Ebbett, V.R., Greyshock, A.E., Vikesland, P.J., November 2003, “The mechanisms, kinetics, and products of Triclosan-disinfectant reactions,” American Water Works Association Water Quality and Technology Conference, Philadelphia.

iii. White papers

1. Wigginton, K. R., Rockey, N., Dodd, M., Kohn, T., Pecson, B., Fontaine, N. A., Bischel, H. (2018) “Review of Non-Culture-Based Methods for Pathogen Monitoring in Potable Reuse,” The Water Research Foundation Project 14-17.

d. Contracts and Grants

1. National Science Foundation (2020-2021), \$198,591, “Collaborative Research: RAPID: Coronavirus persistence, transmission, and circulation in the environment,” PI: **Krista Wigginton**, Co-PIs: Alexandria Boehm, Craig Criddle.
2. Anonymous Donor (2020-2021) \$1,504,872, “SCAN: Sewage Coronavirus Alert Network,” PI: Alexandria Boehm, Co-PI: **Krista Wigginton**.
3. Water Research Foundation (2020-2021), \$63,000, “DPR- 3 Feasibility of Collecting Pathogens in Wastewater During Outbreaks,” PI: **Krista Wigginton**.
4. Hampton Roads Sanitation District (2019-2020), \$74,562, “Wigginton/Hampton

- Roads Sanitation District Collaboration on Improved Assessment of Virus Reductions,” PI: **Krista Wigginton**.
5. University of Michigan College of Engineering (2019-2022) \$2,500,000, “Blue Sky: Remaking Water Infrastructure by Focusing on Microbial Biomes,” PI: Lut Raskin, Co-PIs: Lut Raskin, Steven Skerlos, Branko Kerkez, Seth Guikema, **Krista Wigginton**.
 6. National Science Foundation (2018 - 2019) \$224,982, “STTR Phase I: Protecting Livestock from Airborne Disease Transmission Using Non-thermal Plasma Airstream Disinfection,” PI: Herek Clack, Co-PIs: Krista Wigginton.
 7. National Science Foundation (2017-2021), \$999,089, “RAISE: Neighborhood Environments as Socio-Techno-bio Systems: Water Quality, Public Trust, and Health in Mexico City,” PI: Elizabeth Roberts, Co-PIs: Branko Kerkez, Brisa Sanchez, **Krista R. Wigginton**, Martha M. Tellez-Rojo.
 8. Water Reuse Research Foundations (2017-2019), \$349,794, “Methods for Measurement of Infectivity and Concentration of Pathogens,” PI: **Krista Wigginton**, Co-PIs: Tamar Kohn, Brian Pecson, Christiane Wobus.
 9. National Science Foundation (2016-2020), \$299,968, “INFEWS/T3: Advancing Technologies and Improving Communication of Urine-Derived Fertilizers for Food Production Within a Risk-Based Framework,” PI: Nancy Love, Co-PIs: Diana Aga, Charles Bott, Abe Noe-Hayes, **Krista Wigginton**
 10. Water Reuse Research Foundations (2015-2016), \$50,000, “Review of Non-Culture-Based Methods for Pathogen Monitoring in Potable Reuse,” PI: **Krista Wigginton**, Co-PIs: Michael Dodd, Tamar Kohn, Brian Pecson.
 11. USDA (2016-2018), \$999,921, “Evaluating Different Manure Management Practices in Controlling Spread of Antibiotic Resistance,” PI: Diana Aga, Co-PIs: Gary Felton, Curt Gooch, Lauren Sassourbe, Lut Raskin, Stephanie Lansing, Krista Wigginton.
 12. National Science Foundation (2015-2020), \$3,600,000, “PIRE: Halting Environmental Antimicrobial Resistance Dissemination (HEARD),” PI: Peter Vikesland, Co-PIs: Diana Aga, Pedro Alvarez, Amy Pruden, **Krista Wigginton** (\$417,809).
 13. University of Michigan UMOR Faculty Grant (2015), \$15,000 “Antibiotic Resistance Gene Degradation Mechanisms,” PI: Terese Olson, co-PIs: Carl Marrs, **Krista Wigginton**.
 14. National Science Foundation EAGER (2014-2015), \$63,405 “Dose-Response Disinfection Curves for Human Norovirus with Novel Mouse Model,” PI: **Krista**

Wigginton, Co-PIs: Christiane Wobus, Tamar Kohn.

15. University of Michigan Third Century Initiative Global Challenges Grant (2014), \$2,993,832 “REFRESCH: Researching Fresh Solutions to the Energy/Water/Food Challenge in Resource-Constrained Environments,” PI: Johannes Schwank, Co-PIs: Donald Scavia, Mark Barteau, Andrew Hoffman, Galen Fisher, Shelie Miller, Peter Adriaens, Aileen Huang-Saad, Eric Hill, Joseph Trumpey, Nancy Love, Lutgarde Raskin, Roy Clarke, Steve Skerlos, James Diana, Andrew Tadd, **Krista Wigginton**.
16. University of Michigan UMOR Faculty Grant (2014), \$15,000 “Seasonal variability of respiratory viruses in wastewater treatment processes”, **PI: Krista Wigginton**.
17. Environmental Protection Agency Star Grant for Nutrient Management (2014-2016), \$2,200,000, “WERFs National Center for Resource Recovery and Nutrient Management” Lead PI: WERF, Co-PIs: **Krista Wigginton** (\$330,034), Craig Frear, David Stensel, David Sedlak, Kartik Chandran.
18. National Science Foundation CAREER Award (2014-2019), \$400,000, “Wastewater Treatment as a Conduit and Control of Emerging Respiratory Viruses in the Environment,” PI: **Krista Wigginton**.
19. University of Michigan Water Center Grant (2014-2015), \$250,000, “Microplastics in the Great Lakes: Towards establishing a long-term multidisciplinary research platform to assess the impact of microplastics on Laurentian Great Lakes ecosystem health,” Lead PI: Melissa Duhaime, Co-PIs: **Krista Wigginton** (\$34,831), Dmitry Beletsky
20. University of Michigan Water Center Grant (2013-2014), \$50,000, “High resolution orbitrap mass spectrometry for expanding U-M freshwater research,” PI: **Krista Wigginton**.
21. National Science Foundation BRIGE Award (2012-2014), \$174,365, “A reductionist approach to enterovirus disinfection,” **PI: Krista Wigginton**.
22. University of Maryland Advance Seed Grant (2012-2013), \$20,000, “Multiscale characterization of virus adsorption onto fomites,” PI: **Krista Wigginton** (\$10,000), Co-PI: Sylvinia Matysiak.
23. District of Columbia Water and Sewer Authority (2011-2012), \$24,277, “Transition from a Class B to a Class A Biosolids Treatment Train at the Blue Plains Wastewater Treatment Plant: Impact on Emerging Pathogen Concentrations,” PI: **Krista Wigginton**.
24. National Science Foundation International Postdoctoral Fellowship (2009-2010),

\$143,000, “Virus inactivation in sunlight-treated waters: An investigation on the reactions between singlet oxygen ($^1\text{O}_2$) and virus capsid proteins”, PI: **Krista Wigginton**.

e. Research Fellowships and Awards

1. Paul L. Busch Award from the Water Research Foundation (2018).
2. Virginia Tech Via Department of Civil and Environmental Engineering Outstanding Young Alumni Award (2015).
3. National Science Foundation CAREER Award (2014-2019; listed under Contracts and Grants).
4. University of Michigan Borchardt and Glysson Water Treatment Faculty Scholar (2013-2016).
5. National Science Foundation BRIGE Award (2012; listed under Contracts and Grants).
6. American Water Works Association Academic Achievement Award, Second Place for Best Dissertation (2010).
7. Best Poster Award at the Environmental Sciences: Water Gordon Research Conference (2008).
8. American Chemical Society Ellen Gonter Environmental Chemistry Award (2008).
9. Philanthropic Educational Organization (PEO) Scholar Fellowship (2007-2008).
10. National Science Foundation AdvanceVT Ph.D. Fellowship (2007-2008).
11. American Chemical Society Graduate Student Award in Environmental Chemistry (2004).
12. Virginia Tech Department of Civil and Environmental Engineering Via Scholar (2004-2007).
13. National Science Foundation Graduate Research Fellowship (2003-2006).
14. Chi Epsilon National Civil Engineering Honor Society (2003 - present).

f. Editorships, Editorial Boards, & Reviewing Activities for Journals and Other Learned Publications

1. Associate Editor at *Environmental Sciences: Water Research & Technology* (2018-present).
2. Reviewer for *Science Advances*, *Nature Biotechnology*, *Environmental Science and Technology*, *ES&T Letters*, *Applied and Environmental Microbiology*, *Journal of Environmental Monitoring*, *Micron*, *Journal of Applied Microbiology*, *Biochemistry*, *Water Research*, *Environmental Engineering Science*, *Environmental Science: Water Research & Technology*, *Science of the Total Environment*.
3. Editorial Board of *Chemosphere* (2010-2015).

g. Patents.

1. H. L. Clack, **K. R. Wigginton**, A. S. Lauring (2020) Production of Immune-Response-Stimulating Aerosols By Non-Thermal Plasma Treatment Of Airborne Pathogens, U.S. Patent Application US 2020/0016286 A1.

3. Teaching, Mentoring, and Advising

a. Courses taught

1. Winter 2019, University of Michigan, Environmental Organic Chemistry (CEE 597), Enrollment = 12.
2. Fall 2018, University of Michigan, Environmental Engineering Seminar Series (CEE 880), Enrollment = 68.
3. Winter 2018, University of Michigan, Environmental Engineering Seminar Series (CEE 880), Enrollment = 55.
4. Winter 2017. University of Michigan, Environmental Organic Chemistry (CEE 597), Enrollment = 14.
5. Fall 2016. University of Michigan, Environmental Engineering Principles (CEE 365), Enrollment = 74.
6. Winter 2016. University of Michigan, Physical and Chemical Processes in Water Quality Engineering (CEE 580), Enrollment = 9
7. Fall 2015. University of Michigan, Environmental Engineering Principles (CEE 365), Enrollment = 63.
8. Winter 2015. University of Michigan, Physical and Chemical Processes in Water Quality Engineering (CEE 580), Enrollment = 13.
9. Winter 2014. University of Michigan, Environmental Organic Chemistry (CEE 597), Enrollment = 9.
10. Fall 2013. University of Michigan, Environmental Engineering Principles (CEE 365), Enrollment = 92.
11. Spring 2013. University of Michigan, Environmental Organic Chemistry, (CEE 682), Enrollment = 12.
12. Fall 2012. University of Maryland, Introduction to Environmental Engineering, (ENCE 310), Enrollment = 39.
13. Spring 2012. University of Maryland, Environmental Microbiology: Waterborne Pathogens (ENCE 688N). Enrollment = 12.
14. Fall 2011. University of Maryland, Introduction to Environmental Engineering (ENCE 310). Enrollment = 48.
15. Spring 2011. University of Maryland, Introduction to Environmental Engineering (ENCE 310). Enrollment = 62.

b. Advising

1. Undergraduates: Katherine Graham (2014-2016), Lauren Eastes (2014-2016), Salonia Dagli (2014 - 2016), Mariah Gnegy (2015 - 2016), Ishi Keenum (2015-2017), John Hartert (2015 - 2017), Dylan Raye-Leonard (2017- present), Ariel Roy (2018 - present), Michael Mata (2018 - 2019), Yan Du (2018 - 2019), Kaitlyn Chin (2019 - 2020), Meagan Shibley (2019 - present), Brianna Hansen (2020 – present).
2. Masters: Eric Liang (2013, UMD), Joel Donham (2013, UMD), HK Stephens (2015, UMD), Yinyin Ye (2014), Brianna Juhrend (2014), Miles Ellenberg (2015), Joy Jeyaratnam (2015) Pin Chang (2016), Devibaghya Thirunarayanan (2016), Enrique Rodriguez (2018), Ernesto Paz Martinez (2019), Peter Arts (expected 2021).
3. Ph.D.: Zhong Qiao (2018), Yinyin Ye (2018), Heather Goetsch (2018), Emily Crossette (expected 2020), Nicole Rocky (expected 2020), Kathryn Langenfeld (expected 2021), Enrique Rodriguez (expected 2022), Lucinda Li (expected 2023), Ernesto Paz-Martinez (expected 2023), Kate Harrison (expected 2024), Mira Chaplin (expected 2025).
4. Postdoctoral Researchers: Rebecca Lahr (2014- 2015), William Tarpeh (2017-2018), Bridget Hegarty (2019 - present), Alex Szczuka (starting July 2020).

c. Guest Lectures

1. “Overview of the Environmental Engineering Field,” February, 2019, CEE 200.
2. “Overview of the Environmental Engineering Field,” March, 2015, CEE 200.
3. “Environmental Viruses,” February 19, 2014, Microbiology 415: Virology.

d. Teaching Initiatives and Awards

1. University of Michigan ASCE Student Chapter Professor of the Year Award (2019)
2. MSC Case Study developed for urine diversion technologies (2018)
3. Golden Apple Award nominee for outstanding university teaching (2017)
4. Developed teaching module on peer review for graduate and undergraduate environmental engineering courses (2015)
5. ASCE ExCEED Teaching Fellow (2014)

4. Service

a. Reviewing activities for agencies

1. National Institute of Environmental Health Sciences review panel (2020)
2. National Science Foundation unsolicited panels (2012, 2013), CAREER panel (2014), ad hoc reviewer (2019, 2020)
3. Swiss NSF external reviewer (2013)
4. Environmental Protection Agency Star review panel (2012)

5. US-Israel Agricultural Research & Development Fund external reviewer (2012)

b. Other non-university committees and panels

1. Panelist, National Academies of Science Engineering and Medicine Board Meeting, Wastewater Monitoring for COVID-19 Disease Surveillance (2020)
2. International Water Research Summit on Environmental Surveillance of COVID-19 Indicators in Sewersheds, Co-Chair of Working Group On Detection Methods (2020)
3. ReNUWIt IAB Meeting Panel on Wastewater Surveillance (2020)
4. IWA COVID-19 Science Team (2020)
5. AEESP Membership and Demographics Committee member (2014-present), chair (2018-2019)
6. Session organizer for the Japan America National Academies of Engineering Frontiers of Engineering meeting. Session title “Water Treatment Revolution.” (2018)
7. Session chair at Gordon Research Conference on Disinfection Byproducts (2017)
8. Organized and conducted workshop titled “NSF CAREER Proposals” at AEESP Conference (2017)
9. Co-organized NSF-sponsored workshop titled “Wastewater Handling in Outbreak Response – Lessons and Research,” Alexandria, VA (2016)
10. Member of American Water Works Association Joint Section Research Committee (2015 - present)
11. Symposium organizer with K. Bibby, “Detection and Fate of Health-Related Microorganisms in Water,” Fall ACS National Meeting, Boston, MA (2015)
12. AEESP Reviewer for Faculty Application Packages (2014, 2015)
13. Poster judge at Gordon Research Conference Environmental Science: Water (2014)
14. Senior Discussion Leader at Gordon Research Seminar Environmental Science: Water (2014)
15. 2014 Borchardt Conference Planning Committee (2013 - present)
16. Symposium organizer along with M. Dodd, “Innovative Materials and Technologies for Detection and Inactivation of Environmental Pathogens,” Fall ACS National Meeting, Philadelphia, PA (2012)
17. Panel member for “Academia” session at EPA Star Graduate Conference, Washington D.C. (2011)
18. Symposium organizer along with K. McNeill and T. Kohn, “Degradation of Biomolecules in the Environment,” Fall ACS National Meeting, Denver, CO. (2011)

c. University service

1. COVID CEE ramp up committee
2. Strategic Planning Committee (2017 - current)
3. Facilities and Research Committee (2017 - current)

4. Marshal for Commencement, Honors Convocation, and Rackham Graduate Commencement (2013 - 2019)
5. CEE Chair Search Committee (2016 - 2017)
6. Masters Committee (2014 - 2017)
7. Graduate Student Committee (2013 - 2017)
8. One-Years Masters Committee (2015)
9. Panel Discussion Leader for NextProf Workshop (2015)
10. Guest speaker for Undergraduate Opportunity Program (2015)
11. Visiting Student Weekend Committee (2013)
12. UMD A. James Clark Hall Steering Committee (2012)
13. UMD Faculty Search Committee (2011 - 2012)

d. Outreach

1. Interviewed for the National Science Foundation's Rapid Response COVID-19 Podcast, Episode 4: Monitoring SARS-CoV-2 in Wastewater (2020)
2. Scientific consultant and participant for an episode of Vox Media's "Answered" video series on wastewater surveillance of SARS-CoV-2 (2020)
3. Interviews in the popular press on research including *The New York Times*, *Washington Post*, National Public Radio, *Business Insider*, *Detroit News*, Science Friday, *The Guardian*, *The Daily Beast*, and more
4. Organized urine collection outreach on University of Michigan campus to educate students and public on resource recovery from human waste. Details at <http://dme.engin.umich.edu/toilettotable/> (2015)
5. University of Michigan College of Engineering representative at Hispanic Professional Engineers National Conference (2015)
6. Panel Discussion Leader for University of Michigan NextProf program focused on graduate students and postdocs interested in academic careers (2015)
7. Participation in hands-on summer research activities focused on underrepresented high school, college, and graduate students (years?)
8. University of Maryland ESTEEM Research Presentation and Lab Tours (2012)
9. Instructor volunteer for WitsOn Mentoring Program, an online mentoring forum for female scientists (2012)