Krista Rule Wigginton

1. Personal Information

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

Employment Background

- Assistant Professor of Environmental Engineering in the Department of Civil and Environmental Engineering, University of Michigan, 2013-present.
- Pedro E. Wasmer Assistant Professor of Environmental Engineering in the Department of Civil and Environmental Engineering, University of Maryland, 2011-2012.
- Postdoctoral Researcher, EPFL, Lausanne, Switzerland, 2008-2010.
- Analytical Chemist, Anatek Labs, Inc., Moscow, ID, 2001-2002.

2. Research, Scholarly & Creative Activities

a. Articles in Refereed Journals

1. **Wigginton, K.**, Ye, Y., Ellenberg, M. (2015) "The source and fate of pandemic viruses in the urban water cycle," Environmental Science: Water Science and Technology, ASAP, DOI: 10.1039/C5EW00125K.
2. Donham, J., Rosenfeldt, E., **Wigginton, K.,** (2014) "Photometric hydroxyl radical scavenging analysis of standard natural organic matter isolates," Environmental Science: Processes and Impacts, Vol. 16, pp. 764-769.
3. Sigstam, T, Gannon, G., Cascella, M., Pecson, B., **Wigginton, K**., Kohn, T. (2013) "Subtle differences in virus composition affect disinfection kinetics and mechanisms." Applied and Environmental Microbiology, Vol. 79, pp. 3455-3467.
4. Vikesland, P.V., Fiss, E.M., **Wigginton, K.R**., McNeill, K., Arnold, W.A. (2013) "Halogenation of Bisphenol-A, Triclosan, and Chlorophenols in Chlorinated Waters Containing Iodide." Environmental Science & Technology, Vol. 47, pp. 6764-6772.
5. **Wigginton, K.R.**, Pecson, B.M., Sigstam, T., Bosshard, F., Kohn, T. (2012) "Virus inactivation mechanisms: impact of disinfectants on virus function and structural integrity," Environmental Science & Technology, Vol. 46, pp. 12069-12078.
6. **Wigginton, K.R**., Menin, L., Sigstam, T., Gannon, G., Cascella, M., Hamidane, H.B., Tsybin, Y.O., Waridel, P., Kohn, T. (2012) "UV radiation induces genome-mediated, site-specific cleavage in viral protein," ChemBioChem, Vol. 13, pp. 837-

845.

7. **Wigginton, K.R**., Kohn, T. "Virus disinfection mechanisms: the role of virus composition, structure, and function," (2012) Current Opinion in Virology, Current Opinion in Virology, Vol. 2, pp. 84-89.
8. 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, Vol. 45, pp. 7710-7717.
9. **Wigginton, K.R.**, Menin, L., Montoya, J.P., Kohn, T. (2010) "Oxidation of virus proteins during UV_{254} and singlet oxygen mediated inactivation." Environmental Science and Technology, Vol. 44, 5437–5443.
10. Vikesland, P.J., **Wigginton, K.R.** (2010) "Nanomaterial enabled biosensors for pathogen monitoring – a review." Environmental Science and Technology, Vol. 44, 3656-3669.
11. **Wigginton, K.R**., Vikesland, P.J. (2010) "Gold-coated polycarbonate membrane filter for pathogen concentration and SERS-based detection." The Analyst, Vol. 135, 1320-1326.
12. **Rule, K.L.**, Vikesland, P.J. (2009) "Surface-enhanced resonance Raman spectroscopy for the rapid detection of *Cryptosporidium parvum* and *Giardia lamblia*," Environmental Science and Technology, Vol. 43, 1147-1152.
13. Fiss, M.E., **Rule, K.L.**, Vikesland, P.J. (2007) "Formation of chloroform and other chlorinated byproducts by chlorination of Triclosan-containing antibacterial products." Environmental Science and Technology, Vol. 41, 2387-2394.
14. **Rule, K.L.,** Ebbett, V.R., Vikesland, P.J., (2005). "Formation of chloroform and chlorinated organics by free-chlorine mediated oxidation of Triclosan" Environmental Science and Technology, Vol. 39, 3176-3185.
15. **Rule, K.L.,** Selvaraj, I.I., Kirchmeier, R.L. (2001). "Synthesis and characterization of per/polyfluorophenoxy derivatives of octachlorocyclotetraphosphazenes." Journal of Fluorine Chemistry, Vol. 112, 307-312 Sp. Iss.

b. Talks, Abstracts, and Other Professional Papers Presented

i. Invited Talks

1. Wigginton, K., March 2015, "The Fate of Emerging Biochemical Contaminants in Wastewater Disinfecting Treatments," Pittcon Conference, New Orleans.
2. Wigginton, K. November 2014, "Biological and Chemical Fate of Viruses in Water Treatment Processes", Civil and Environmental Engineering Department Seminar, University of Pittsburgh, Pittsburg PA.
3. Wigginton, K.R., March 2014, "A closer look at waterborne viruses", Civil and Environmental Engineering Department Seminar, Syracuse University, Syracuse, NY.

4. 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.
5. 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.
6. Wigginton, K.R., April 2013, "Routes to Protein Damage with UVC", ReNUWit Workshop on Sunlight Degradation of Biomolecules and Microorganisms, Stanford, CA.
7. 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.
8. 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.
9. 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.
10. 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. Jeyaratnam, J., Wigginton, K., "Bacteriophage-assisted ARG Transfer Within Drinking Water Distribution Systems," WQTC, November 2015.
2. 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.
3. 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.
4. Ye, Y., Wigginton, K., "Methods for the Detection of Infective Enveloped Viruses in Municipal Wastewater", ACS National Fall Conference, Boston, August 2015.
5. Wigginton, K., Ye, Y., "The implications of a virus pandemic on wastewater

and drinking water treatment", AEESP Conference, New Haven, June 2015.

6. 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.
7. Wigginton, K., Qiao, Z., "Chemical Fate of Nucleic Acids During Disinfecting Treatments," International Symposium on Waterborne Pathogens Program, Savannah, April 2015.
8. Wigginton, K., Nucleic Acid Pollutant Fate in Disinfecting Treatments," 2014 Borchardt Conference, Ann Arbor, February 2014.
9. Donham, J., Rosenfeldt, E., Wigginton, K., "Analysis of $k_{NOM\text{-}OH\cdot}$ for NOM isolates and drinking water samples with rapid background scavenging technique," ACS National Spring Meeting, New Orleans, April 2013.
10. Donham, J., Rosenfeldt, E., Wigginton, K., "Variability of Background Hydroxyl Radical Scavenging in Drinking Water," IUVA 2012 Americas Conference, August, 2012.
11. 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.
12. 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.
13. 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.
14. Wigginton, K.R., October 2010, "The kinetics and products of virus protein degradation during water disinfection," COST-929 Symposium, Istanbul, Turkey.
15. Wigginton, K.R., Pecson, B.M, Kohn, T., March 2010, "Virus oxidation in sunlit waters," American Chemical Society Spring Meeting, San Francisco, CA.
16. 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.
17. 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.
18. 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.

19. 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.
20. 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.
21. 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.
22. 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.

c. Contracts and Grants.

1. 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).

2. 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.

3. University of Michigan UMOR Faculty Grant (2015), $15,000 "Antibiotic Resistance Gene Degradation Mechanisms," PI: Terese Olson, co-PIs: Carl Marrs, **Krista Wigginton**.

4. 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.

5. UM 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**.

6. University of Michigan UMOR Faculty Grant (2014), $15,000 "Seasonal variability of respiratory viruses in wastewater treatment processes", **PI:**

Krista Wigginton.

7. 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.

8. 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**.

9. 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

10. University of Michigan Water Center Grant (2013-2014), $50,000, "High resolution orbitrap mass spectrometry for expanding U-M freshwater research," PI: **Krista Wigginton.**

11. National Science Foundation BRIGE Award (2012-2014), $174,365, "A reductionist approach to enterovirus disinfection," **PI: Krista Wigginton.**

12. UMD Advance Seed Grant (2012-2013), $20,000, "Multiscale characterization of virus adsorption onto fomites," PI: **Krista Wigginton** ($10,000), Co-PI: Sylvina Matysiak.

13. 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**.

14. National Science Foundation International Postdoctoral Fellowship (2009-2010), $143,000, "Virus inactivation in sunlight-treated waters: An investigation on the reactions between singlet oxygen ($^1O_2$) and virus capsid proteins", PI: **Krista Wigginton**.

d. Research Fellowships and Awards

1. Virginia Tech Via Department of Civil and Environmental Engineering Outstanding Young Alumni Award (2015).
2. NSF CAREER Award (2014-2019; listed under Contracts and Grants).
3. Borchardt and Glysson Water Treatment Faculty Scholar (2013-present).
4. NSF BRIGE Award (2012; listed under Contracts and Grants).

5. AWWA Academic Achievement Award, Second Place for Best Dissertation (2010).
6. Best Poster Award at the Environmental Sciences: Water Gordon Research Conference (2008).
7. ACS Ellen Gonter Environmental Chemistry Award (2008).
8. Philanthropic Educational Organization (PEO) Scholar Fellowship (2007-2008).
9. National Science Foundation AdvanceVT Ph.D. Fellowship (2007-2008).
10. American Chemical Society Graduate Student Award in Environmental Chemistry (2004).
11. Virginia Tech Department of Civil and Environmental Engineering Via Scholar (2004-2007).
12. National Science Foundation Graduate Research Fellowship (2003-2006).
13. Chi Epsilon National Civil Engineering Honor Society (2003 - present).

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

1. Reviewer for *Environmental Science and Technology, Applied and Environmental Microbiology, Journal of Environmental Monitoring, Micron*, *Applied Microbiology, Biochemistry, Water Research, Environmental Engineering Science*.
2. Editorial Board of *Chemosphere*.

3. Teaching, Mentoring, and Advising

a. Courses taught in the last five years.

1. Fall 2015. University of Michigan, Environmental Engineering Principles (CEE 365), Enrollment = 64.
2. Winter 2015. University of Michigan, Physical and Chemical Processes in Water Quality Engineering (CEE 580), Enrollment = 13.
3. Winter 2014. University of Michigan, Environmental Organic Chemistry (CEE 597), Enrollment = 9.
4. Fall 2013. University of Michigan, Environmental Engineering Principles (CEE 365), Enrollment = 92.
5. Spring 2013. University of Michigan, Environmental Organic Chemistry, (CEE 682), Enrollment = 12.
6. Fall 2012. University of Maryland, Introduction to Environmental Engineering, (ENCE 310), Enrollment = 39.
7. Spring 2012. University of Maryland, Environmental Microbiology: Waterborne Pathogens (ENCE 688N). Enrollment = 12.

8. Fall 2011. University of Maryland, Introduction to Environmental Engineering (ENCE 310). Enrollment = 48.
9. Spring 2011. University of Maryland, Introduction to Environmental Engineering (ENCE 310). Enrollment = 62.

b. Advising:

a. Undergraduates. Katherine Graham (2014-present), Lauren Eastes (2014-present), Salonia Dagli (2014-present), Mariah Gnegy (2015-present).

b. Masters. Eric Liang (2013, UMD), Joel Donham (2013, UMD), HK Stephens (2015, UMD), Yinyin Ye (2014, UM), Brianna Juhrend (2014, UM), Miles Ellenberg (2015, UM), Pin Chang (expected 2015, UM).

c. Ph.D. Joy Jeyaratnam (expected 2018), Zhong Qiao (expected 2017), Yinyin Ye (expected 2018), Heather Goesch (expected 2018), Emily Crossette (expected 2020), Nicole Rocky (expected 2020).

d. Postdoctoral Researchers. Rebecca Lahr (2014- 2015).

c. Guest Lectures

a. "Environmental Viruses", February 19, 2014, Microbiology 415: Virology.
b. "Overview of the Environmental Engineering Field," March 18, 2015, CEE 200.

d. Teaching Initiatives and Awards

a. ASCE ExCEEd Teaching Fellow (2014)
b. Developed teaching module on peer review for graduate and undergraduate environmental engineering courses (2015)

4. Service

a. Professional

i. Reviewing activities for agencies

1. NSF Environmental Engineering Unsolicited Panels (2012, 2013), NSF Environmental Engineering CAREER Panel (2014)
2. EPA Star Panel (2012)
3. US-Israel Agricultural Research & Development Fund external reviewer
4. Swiss NSF external reviewer

ii. Other non-University committees and panels

1. Member of American Water Works Association Joint Section Research Committee (2015-present)
2. Symposium organizer along with K. Bibby, "Detection and Fate of Health-Related Microorganisms in Water," August 2015, Fall ACS

National Meeting, Boston, MA.

3. AEESP Reviewer for Faculty Application Packages 2014, 2015
4. Poster judge at 2014 GRC Environmental Science: Water
5. AEESP Membership and Demographics Committee (2014-present)
6. Senior Discussion Leader at 2014 GRS Environmental Science: Water
7. 2014 Borchardt Conference Planning Committee, 2013-present.
8. Symposium organizer along with M. Dodd, "Innovative Materials and Technologies for Detection and Inactivation of Environmental Pathogens," August 2012, Fall ACS National Meeting, Philadelphia, PA.
9. Panel member for "Academia" session at EPA Star 2011 Star Graduate Conference, September 2011, Washington D.C
10. Symposium organizer along with K. McNeill and T. Kohn, "Degradation of Biomolecules in the Environment," August 2011, Fall ACS National Meeting, Denver, CO.

b. Campus

i. Departmental

1. UM CEE One-Years Masters Committee (2015).
2. UM CEE Masters Committee (2014-present).
3. UM CEE Graduate Student Committee (2013- present).
4. UMD CEE Faculty Search Committee (Spring 2011).
5. UM CEE Visiting Student Weekend Committee (Spring 2013).
6. UMD CEE Faculty Search Committee (Spring 2012).

ii. College

1. Panel Discussion Leader for UM NextProf (May 2015).
2. A. James Clark Hall Steering Committee (2012).

iii. University

1. University of Michigan Marshal for December 2013 Commencement and 2014 Annual Honors Convocation.
2. Guest speaker for Undergraduate Opportunity Program (March 2015).

c. Outreach

i. Organized urine collection event 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).

ii. Activities focused on students from underrepresented backgrounds

1. UM College of Engineering representative at Hispanic Professional Engineers National Conference (2015).

2. Panel Discussion Leader for UM NextProf program focused on graduate students and postdocs interested in academic careers (May 2015).
3. Participation in hands-on summer research activities focused on underrepresented high school, college, and graduate students.
    a. College 101 (2013)
    b. UMD ESTEEM Research Presentation and Lab Tours, (2012).
4. Instructor volunteer for WitsOn Mentoring Program, an online mentoring forum for female scientists (2012).