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Engineering & Scientific Consulting

Aidan Foster, Ph.D.

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Professional Profile

Aidan Foster, Ph.D., is an environmental scientist and microbiologist who specializes in water treatment technologies, environmental virology, disinfection, and the detection of microbial pathogens in the built and natural environments. He supports public health and water quality efforts by investigating pathogen fate in water systems, wastewater-based epidemiology, water and wastewater treatment, and pathogen removal and disinfection processes.

Dr. Foster earned his Ph.D. in Soil, Water and Environmental Science from the University of Arizona, where he conducted research at the Water & Energy Sustainable Technology Center. Throughout this work he partnered with leaders in the private and public sectors to develop and evaluate new water reuse strategies and technologies. Dr. Foster used his expertise in environmental pathogens to support the development of direct potable reuse technologies, assess microbial presence in environmental matrices, and evaluate methods of pathogen inactivation.

His research efforts have included management and prevention of biofilms using magnetic water treatment; evaluation of chloramination as a barrier against coronavirus in reclaimed water; virus rejection by advanced water treatment processes; and the application of wastewater-based epidemiology to monitor the presence of SARS-CoV-2 and inform public health responses.

In addition, Dr. Foster has used his technical background in microbial detection to support efforts in a broad range of projects including near real-time assessments of soil microbial activity; virus survival in soils for pandemic response; evaluation of antimicrobial compounds; and the reduction of chlorine demand in swimming pools via magnetic water treatment.

Academic Credentials & Professional Honors

Ph.D., Soil, Water & Environmental Science, University of Arizona, 2022

PSM, Applied Biosciences, University of Arizona, 2018

B.S., Microbiology, University of Arizona, 2016

Co-chair, Virus Disinfection and Treatment session – International Society for Food and Environmental Virology (ISFEV), Tokyo, 2025.

Agriculture, Life and Veterinary Sciences, and Cooperative Extension (ALVSCE) Team Award for work on wastewater-based epidemiology at the University of Arizona, University of Arizona, 2022.

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Prior Experience

Postdoctoral Research Associate, University of Arizona, 2022-2024.

Graduate Research Associate, University of Arizona, 2017-2022.

Undergraduate Researcher, University of Arizona, 2015-2016.

Professional Affiliations

International Society for Food and Environmental Virology, (ISFEV), 2022-Present.

Publications

Foster AR, Pepper IL (in press). Biofilms. In: Environmental microbiology. 4th ed. Elsevier Inc.; 2026.

Foster AR, Stark ER, Ikner LA, Pepper IL. Effects of magnetically treated water on the survival of bacteria in biofilms. Biofouling 2024; 41(1):79–91.

Foster AR, Haas CN, Gerba CP, Pepper IL. Effectiveness of monochloramine for inactivation of coronavirus in reclaimed water. Science of The Total Environment 2024; 906:167634.

Prasek SM, Pepper IL, Innes GK, Slinski S, Betancourt W Q, **Foster AR**, Yaglom HD, Porter WT, Engelthaler DM, Schmitz BW. Variant-specific SARS-CoV-2 shedding rates in wastewater. Science of The Total Environment 2023; 857:159165.

Foster AR, Stark ER, Ikner LA, Pepper IL. Bench scale investigation of the effects of a magnetic water treatment device in pool systems on chlorine demand. Journal of Water Process Engineering 2022; 50:103198.

Schmitz BW, Innes GK, Prasek SM, Betancourt WQ, Stark ER, **Foster AR**, Abraham AG, Gerba CP, Pepper IL. Enumerating asymptomatic COVID-19 cases and estimating SARS-CoV-2 fecal shedding rates via wastewater-based epidemiology. Science of The Total Environment 2021; 801:149794.

Betancourt WQ, Schmitz BW, Innes GK, Prasek SM, Pogreba Brown KM, Stark ER, **Foster AR**, Sprissler RS, Harris DT, Sherchan SP, Gerba CP, Pepper IL. COVID-19 containment on a college campus via wastewater-based epidemiology, targeted clinical testing and an intervention. Science of The Total Environment 2021; 779:146408.

Presentations

Foster AR, Alhussaini M, Miguel De Souza-Chaves B, Betancourt Q, Ikner L, Hickenbottom K, Achilli A. Extending the Life of Engineering-Scale Nanofiltration Membranes by Chlorination and Impacts on Virus Rejection. Oral Presentation at International Society for Food and Environmental Virology (ISFEV) conference, Tokyo, Japan, 2024.

Foster AR. Reduction of Biofilm Formation by Magnetic Treatment. Oral presentation at Water and Environmental Technology (WET) Center Meeting, Phoenix, AZ, 2022.

Foster AR. Assessment of Chloramination as a Barrier to Coronavirus in Water Distribution Systems. Poster at International Society for Food and Environmental Virology (ISFEV), Santiago de Compostela, Spain, 2022.

Foster AR. Effects of Magnetic Water Treatment on Bacterial Survival in Biofilms. Poster at Arizona Water Association, Phoenix, AZ, 2022.

Foster AR. Effects of Magnetic Water Treatment on Bacterial Survival in Biofilms. Oral presentation at Water and Environmental Technology (WET) Center Industrial Advisory Board (IAB) Annual Meeting, Phoenix, AZ, 2021.

Foster AR. Assessment of Chloramination as a Barrier to Coronavirus in Water Distribution Systems. Oral presentation at Water and Environmental Technology (WET) Center Industrial Advisory Board (IAB) Annual Meeting, Phoenix, AZ, 2021.

Foster AR. Wastewater Epidemiology and Disinfection of Coronavirus by Monochloramine. Oral presentation at Arizona Hydrological Society, online, 2021.

Foster AR. Influence of Magnetic Fields on Biofilm Development and Destruction. Oral presentation at Water and Environmental Technology (WET) Center Industrial Advisory Board (IAB) Annual Meeting, Tucson, AZ, 2020.

Foster AR. Influence of Magnetic Fields on the Efficacy of Chlorine Disinfection. Oral presentation at Water and Environmental Technology (WET) Center Industrial Advisory Board (IAB) Annual Meeting, Tucson, AZ, 2019.

Foster AR. Influence of Magnetic Fields on the Efficacy of Chlorine Disinfection. Poster at 20th International Water Association Health-Related Water Microbiology Symposium 2019, Vienna, Austria, 2019.

Foster AR. Fate of Viruses during Anammox Side Stream Treatment of Wastewater Effluent. Poster at International Society for Food and Environmental Virology (ISFEV) conference, Phoenix, AZ, 2018.

Foster AR. Fate of Viruses during Anammox Side Stream Treatment of Wastewater Effluent. Oral presentation at AZ Water 91st Annual Conference, Phoenix, AZ, 2018.

Foster AR. Fate of Viruses during Anammox Side Stream Treatment of Wastewater Effluent. Poster presented at AZ Water Association Research Committee Symposium, Phoenix, AZ, 2018.

Foster AR. Anammox: Novel Technology for Nitrogen Removal. Oral presentation at Water and Environmental Technology (WET) Center Industrial Advisory Board (IAB) Annual Meeting, Tucson, AZ, 2017.

Project Experience

Wastewater-based Epidemiology – Municipal Wastewater

Monitored and quantified the presence of SARS-CoV-2 in over 18 different wastewater streams across a university campus and surrounding community. Optimized workflows to ensure same day data delivery data to public health officials to facilitate public health interventions.

Environmental Detection of Pathogens – Soil, Water, and Fomites

Leveraged molecular (qPCR and dPCR) and culture-based methods of detection to evaluate the presence and survival of enteric pathogens and indicator organisms in the environment (soil, water, and fomites).

Direct Potable Reuse – Municipal Wastewater

Conducted pathogen fate studies through engineering-scale advanced water treatment systems. Collaborated with engineers to utilize findings to optimize these processes for direct potable reuse applications.

Magnetic Water Treatment – Biofilms

Designed and evaluated the impacts of a commercial magnetic water treatment technology on the prevention and removal of biofilms to supplement conventional microbial management processes.

Chlorination and Chloramination

Designed and evaluated chloramination as a barrier for coronavirus in reclaimed waters across different seasons to mitigate public health concerns. Investigated technologies for the reduction of chlorine demand in recreational waters to reduce costs by decreasing chlorine consumption.

Disinfection

Partnered with industry leaders to test the efficacy of antimicrobial compounds, disinfection processes, and antimicrobial surface coatings; utilized molecular methods of detection, mammalian cell culture, and standard microbiological techniques to quantify the survival of viruses and enteric bacteria.