



Dr. Jens Blotevogel

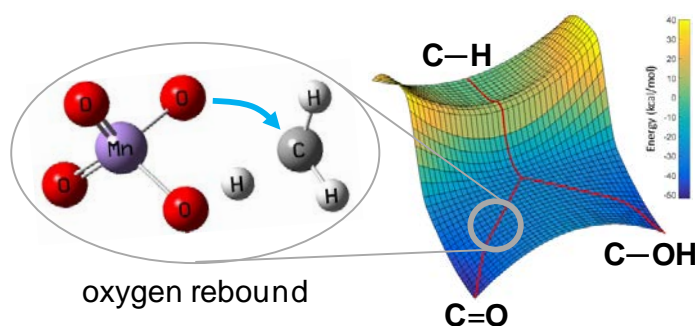
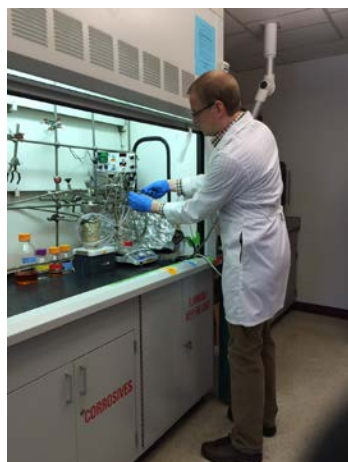
- Research Assistant Professor, Department of Civil & Environmental Engineering, Colorado State University
- Research Scientist, Center for Contaminant Hydrology
- Principal Investigator, The University Consortium

Dr. Blotevogel is a Research Assistant Professor in the Department of Civil & Environmental Engineering at Colorado State University (CSU). He holds a Dipl.-Ing. in Environmental Engineering from the Technical University Berlin and a Ph.D. in Environmental Chemistry from CSU.

Dr. Blotevogel's main research thrusts are:

- Groundwater remediation technologies for the destruction of persistent organic contaminants
- Theoretical models for the prediction of degradation pathways, kinetics, and mechanisms
- Advanced target and non-target analytical methods with focus on high-resolution mass spectrometry
- Environmental impact studies

Dr. Blotevogel started his professional career 15 years ago as project engineer for groundwater remediation with Arcadis. After three years working on site characterization, *in situ* remediation, and natural attenuation, he returned to academia to obtain his Ph.D. under Drs. Thomas Borch and Tom Sale at CSU.



The Blotevogel group at CSU's Center for Contaminant Hydrology is a team of interdisciplinary scientists (analytical and environmental chemistry, biochemistry) and engineers (civil, environmental, chemical) working on the degradation of emerging contaminants in both natural and engineered systems. Recognizing the key role of redox chemistry in contaminant transformation, their focus is on enhancing chemical and biological electron transfer and tracking the fate of transient intermediate products.

The team's current work is aimed at:

- (Bio)electrochemical oxidation and reduction of persistent compounds such as 1,4-dioxane, per- and polyfluoroalkyl substances (PFASs), and perchlorate in mixed contaminant plumes
- Ultra-high-resolution mass spectrometry ("petroleomics") for the characterization of polar hydrocarbons in weathered plumes and identification of biomarkers
- Natural attenuation, enhanced aerobic biodegradation, and advanced oxidation of nitroaromatic compounds
- Beneficial reuse of oil & gas produced water for crop irrigation and livestock watering
- Combined chemical and toxicological characterization for the assessment of complex contaminant mixtures

Selected Papers and Theses

Selected Publications

Blotevogel, J.; Pijls, C.; Scheffer, B.; de Waele, J.-P.; Lee, A.; van Poecke, R.; van Belzen, N.; Staal, W. (2019): Pilot-Scale Electrochemical Treatment of a 1,4-Dioxane Source Zone. *Groundwater Monitoring & Remediation*, 39, 36-42.

Kiaalhosseini, S.; Kohn, B.; Watson, A.T.; Sale, T.; Blotevogel, J. (2019): Magnetic Resonance Imaging of Non-Aqueous Phase Liquid Distribution in Sediments Using Discriminatory Freezing. *Groundwater Monitoring & Remediation*, 39, 72-75.

Hanson, A.J.; Luek, J.L.; Tummings, S.; McLaughlin, M.; Blotevogel, J.; Mouser, P.J. (2019): High total dissolved solids in shale gas wastewater inhibits biodegradation of alkyl and nonylphenol ethoxylate surfactants. *Science of the Total Environment*, 668, 1094-1103.

Akyon, B.; McLaughlin, M.; Hernandez, F.; Blotevogel, J.; Bibby, K. (2019): Characterization and Biological Removal of Organic Compounds from Hydraulic Fracturing Produced Water. *Environmental Science: Processes & Impacts*, 2, 279-290.

McDevitt, B.; McLaughlin, M.; Cravotta, C.A.; Ajemigbitse, M.A.; Van Sice, K.J.; Blotevogel, J.; Borch, T.; Warner, N.R. (2019): Emerging investigator series: radium accumulation in carbonate river sediments at oil and gas produced water discharges: implications for beneficial use as disposal management. *Environmental Science: Processes & Impacts*, 21, 324-338.

Thomas, L.; Tang, H.; Kalyon, D.M.; Aktas, S.; Arthur, J.D.; Blotevogel, J.; Carey, J.W.; Filshill, A.; Fu, P.; Hsuan, G.; Hu, T.; Soeder, D.; Shah, S.; Vidic, R.; Young, M.H. (2019): Toward better hydraulic fracturing fluids and their application in energy production: A review of sustainable technologies and reduction of potential environmental impacts. *Journal of Petroleum Science and Engineering*, 173, 793-803.

Danforth, C.; McPartland, J.; Blotevogel, J.; Coleman, N.; Devlin, D.; Olsgard, M.; Parkerton, T. F.; Saunders, N. (2019): Alternative Management of Oil and Gas Produced Water Requires More Research on its Hazards and Risks. *Integrated Environmental Assessment and Management*, doi: 10.1002/ieam.4157.

Blotevogel, J.; Rappé, A.K.; Mayeno, A.N.; Sale, T.C.; Borch, T. (2018): The mechanism of C-H bond oxidation by aqueous permanganate. *Environmental Science & Technology*, 52, 9845-9850.

Blotevogel, J.; Giraud, R.J.; Borch, T. (2018): Reductive Defluorination of Perfluorooctanoic Acid by Zero-Valent Iron and Zinc: A DFT-Based Kinetic Model. *Chemical Engineering Journal*, 335, 248-254.

Oetjen, K.; Blotevogel, J.; Borch, T.; Ranville, J.F.; Higgins, C.P. (2018): Simulation of a Hydraulic Fracturing Wastewater Surface Spill into an Agricultural Soil. *Science of the Total Environment*, 645, 229-234.

Oetjen, K.; Chan, K.E.; Gulmark, K.; Christensen, J.H.; Blotevogel, J.; Borch, T.; Spear, J.R.; Cath, T.Y.; Higgins, C.P. (2018): Temporal Characterization and Statistical Analysis of Flowback and Produced Waters and Their Potential for Reuse. *Science of the Total Environment*, 619-620, 654-664.

Heyob, K.M.; Blotevogel, J.; Brooker, M.; Volker, M.; Lenhart, J.J.; Wright, J.; Lamendella, R.; Borch, T.; Mouser, P.J. (2017): Natural Attenuation of Nonionic Surfactants Used in Hydraulic Fracturing Fluids: Degradation Rates, Pathways, and Mechanisms. *Environmental Science & Technology*, 51, 13985-13994.

Jasmann, J.R.; Gedalanga, P.B.; Borch, T.; Mahendra, S.; Blotevogel, J. (2017): Synergistic Treatment of Mixed 1,4-Dioxane and Chlorinated Solvent Contaminations by Coupling Electrochemical Oxidation with Aerobic Biodegradation. *Environmental Science & Technology*, 51, 12619-12629.

Burgos, W.D.; Castillo-Meza, L.; Tasker, T.L.; Geeza, T.J.; Drohan, P.J.; Liu, X.; Landis, J.D.; Blotevogel, J.; McLaughlin, M.; Borch, T.; Warner, N.R. (2017): Watershed-Scale Impacts from Surface Water Disposal of Oil and Gas Wastewater in Western Pennsylvania. *Environmental Science & Technology*, 51, 8851-8860.

Oetjen, K.; Giddings, C.G.S.; McLaughlin, M.; Nell, M.; Blotevogel, J.; Helbling, D.E.; Mueller, D.; Higgins, C.P. (2017): Emerging analytical methods for the characterization and quantification of organic contaminants in flowback and produced water. *Trends in Environmental Analytical Chemistry*, 15, 12-23.

Kahrilas, G.A.; Blotevogel, J.; Corrin, E.R.; Borch, T. (2016): Downhole Transformation of the Hydraulic Fracturing Fluid Biocide Glutaraldehyde: Implications for Flowback and Produced Water Quality. *Environmental Science & Technology*, 50 (20), 11414-11423.

Jasmann, J.R.; Borch, T.; Sale, T.C.; Blotevogel, J. (2016): Advanced Electrochemical Oxidation of 1,4-Dioxane via Dark Catalysis by Novel Titanium Dioxide (TiO₂) Pellets. *Environmental Science & Technology*, 50 (16), 8817-8826.

McLaughlin, M.C.; Borch, T.; Blotevogel, J. (2016): Spills of Hydraulic Fracturing Chemicals on Agricultural Topsoil: Biodegradation, Sorption, and Co-contaminant Interactions. *Environmental Science & Technology*, 50 (11), 6071-6078.

Kahrilas, G.A.*; Blotevogel, J.*; Stewart, P.S.; Borch, T. (2015): Biocides in Hydraulic Fracturing Fluids: A Critical Review of Their Usage, Mobility, Degradation, and Toxicity. *Environmental Science & Technology*, 49 (1), 16-32. *Denotes co-first authors.

Thurman, E.M.; Ferrer, I.; Blotevogel, J.; Borch, T. (2014): Analysis of Hydraulic Fracturing Flowback and Produced Waters Using Accurate Mass: Identification of Ethoxylated Surfactants. *Analytical Chemistry*, 86, 9653-9661.

Recent Theses

Maxine Cottrell, M.S. thesis: REACTOR DESIGN FOR ELECTROCHEMICAL OXIDATION OF THE PERSISTENT ORGANIC POLLUTANT 1,4-DIOXANE IN GROUNDWATER.

Jeremy Jasmann, Ph.D. thesis: CATALYTIC STRATEGIES FOR ENHANCING ELECTROCHEMICAL OXIDATION OF 1,4-DIOXANE: TiO₂ DARK ACTIVATION AND MICROBIAL STIMULATION.

Genevieve Kahrilas, Ph.D. thesis: THE DOWNHOLE BEHAVIOR OF THE CHEMICALS OF HYDRAULIC FRACTURING – AN INSIGHT TO THE NATURE OF BIOCIDES AND SURFACTANTS UNDERGROUND.

Molly McLaughlin, M.S. thesis: ENVIRONMENTAL FATE OF HYDRAULIC FRACTURING FLUID ADDITIVES AFTER SPILLAGE ON AGRICULTURAL TOPSOIL.

Zoe Bezold, M.S. thesis: INVESTIGATION OF TEMPERATURE EFFECTS ON SUBSURFACE ATTENUATION OF NITROAROMATIC COMPOUNDS.