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Engineering & Scientific Consulting

Kasia Grzebyk, Ph.D.

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Professional Profile

Dr. Kasia Grzebyk is a water quality scientist with expertise in the production of potable water from alternative sources, including wastewater effluent and contaminated ground and surface waters. She specializes in high-pressure membrane filtration of both organic and inorganic pollutants, including emerging contaminants such as PFAS, pharmaceuticals, pesticides, and personal care products, as well as salt and boron. She has over 6 years of experience in designing and operating high-pressure filtration systems, as well as in modifying reverse osmosis and nanofiltration membranes for enhanced performance in drinking water production.

Membrane modifications that Dr. Grzebyk regularly implemented centered on the interfacial polymerization reaction, and included the use of various nanoparticles to alter reaction conditions. To assess resulting membrane efficacy in the removal of contaminants of emerging concern, Dr. Grzebyk executed and optimized analytical techniques for contaminant detection. She is also familiar with membrane characterization techniques to evaluate polyamide active layer features, including scanning electron microscopy and transmission electron microscopy.

Dr. Grzebyk's expertise extends beyond the bench. Her field experience includes analyzing surface water for various water quality parameters and collecting ground and surface water for PFAS analyses. Dr. Grzebyk also has a strong background in bridging science to practice and collaborating across boundaries on complex issues. As a graduate student, she was actively involved in science communication, designing and performing STEM outreach activities pertaining to polymer science and water filtration technologies. Additionally, she held several science policy appointments and worked to inform environmental policy by connecting the expertise of researchers at North Carolina universities with the needs of State legislators.

Academic Credentials & Professional Honors

Ph.D., Environmental Sciences and Engineering, University of North Carolina, Chapel Hill, 2019

M.S., Biology and Geography, Uniwersytet Jagielloński, 2011

B.S., Pharmacology, University of California, Santa Barbara, 2007

Brown and Caldwell Eckenfelder Scholarship, 2017

American Membrane Technology Association (AMTA) / U.S. Bureau of Reclamation (USBR) Fellowship for Membrane Technology, 2016

American Association for the Advancement of Science (AAAS) Emerging Leaders Fellowship, 2016

University of North Carolina at Chapel Hill Graduate School Fellowship, 2013

Prior Experience

Associate in Research, Duke University (Pratt School of Engineering), 2019

Research Associate, North Carolina State University, 2019

Research Assistant, North Carolina Policy Collaboratory, 2017–2019

Research Assistant, University of North Carolina at Chapel Hill, 2014–2017

Teaching Assistant, University of North Carolina at Chapel Hill, 2013–2014

Research Associate, Vertex Pharmaceuticals, 2008–2009

Professional Affiliations

American Association for the Advancement of Science (AAAS)

American Membrane Technology Association (AMTA)

American Water Works Association (AWWA)

American Water Works Association Pacific Northwest Section (PNWS-AWWA)

North American Membrane Society (NAMS)

Water Environment Federation (WEF)

Languages

Polish

Publications

Atkinson AJ, Wang J, Grzebyk K, Zhang Z, Jung D, Zeng D, Pollard A, Gold A, Coronell O. Scalable fabrication of anti-biofouling membranes through 2-aminoimidazole incorporation during polyamide casting. Journal of Membrane Science 2019; 579:151-161.

Dheyongera G, Grzebyk K, Rudolf AM, Sadowska ET, Koteja P. The effect of chlorpyrifos on thermogenic capacity of bank voles selected for increased aerobic exercise metabolism. Chemosphere 2016; 149:383-390

Presentations

Warren J, Grzebyk K. Establishing a collaborative per- and polyfluoroalkyl substances (PFAS) testing network in North Carolina. Oral presentation, 2019 Emerging Contaminants in the Environment Conference (ECEC19), Champaign, IL, 2019.

Grzebyk K, Coronell O. Empirical evidence suggests that polyamide film formation during interfacial polymerization in thin film composite (TFC) membranes is not self-limiting. Oral presentation, North American Membrane Society 28th Annual Meeting (NAMS 2019), Pittsburgh, PA, 2019.

Armstrong MD, Kingsbury R, Grzebyk K, Coronell O. Ion exchange polymer coatings enhance solute rejection of polyamide thin-film composite membranes. Poster presentation, North American Membrane Society 28th Annual Meeting (NAMS 2019), Pittsburgh, PA, 2019.

Grzebyk K, Coronell O. A closer look at interfacial polymerization of polyamide high-pressure membranes. Poster presentation, 2019 Membrane Technology Conference & Exposition (MTC 2019), New Orleans, LA, 2019.

Grzebyk K, Weinberg H, Coronell O. Optimizing and evaluating thin-film nanocomposite (TFN) membranes for water reuse applications. Poster presentation, 2018 Membrane Technology Conference & Exposition (MTC 2018), West Palm Beach, FL, 2018.

Grzebyk K, Jha S, George A, Battista N, Wachen J, Lana J, Langloss B, Arscott J. Drinking water challenges in the Triangle Region. Oral presentation, 2016 North Carolina American Water Works Association - Water Environment Federation Annual Conference (NC AWWA-WEA), Raleigh, NC, 2016.

Selected Invited Presentations

Grzebyk K. Community-scientist partnerships: Bridging the gap between communities and science. Presenter, American Association for the Advancement of Science (AAAS) 2017 Annual Meeting, Boston, MA, 2017.

Grzebyk K. American Association for the Advancement of Science (AAAS) Committee on Scientific Freedom and Responsibility. Panelist, AAAS 2016 Annual Meeting, Washington, D.C., 2016.

Media Coverage

Thompson, A. Human Water Cycle: Drinking Water. NBC News Learn, Feb 7, 2017.

Project Experience

Performed water quality fieldwork in North Carolina. Collected ground and surface water throughout the state (at drinking water treatment plants, nuclear and coal power plants, farms, lakes, and rivers) to evaluate the extent of PFAS contamination in drinking water sources. Executed proper field sampling protocols to minimize sample contamination and optimize data quality. Prepared raw water samples for the analysis of approximately 50 types of PFAS compounds.

Managed legislative studies and environmental research endeavors that connected the expertise of professors at North Carolina universities with the needs of State and local governments. Advised project managers on a multidisciplinary statewide research collaboration (the North Carolina PFAST Network) that assessed PFAS environmental presence and investigated removal technologies. Managed a group of over 100 experts and stakeholders whose work led to a ratified NC Senate bill for State aquaculture.

Evaluated the impacts of membrane fabrication modifications and polymer type on the removal of approximately 30 types of PFAS species from impacted ground and surface waters. Tested PFAS removal efficiency of reverse osmosis and nanofiltration membranes under conditions mimicking those of full-scale (i.e., drinking water treatment facilities) and home filtration operations.

Analyzed the self-limiting quality of interfacial polymerization in high pressure membrane fabrication. Developed novel reaction conditions that influenced polyamide active layer formation, producing membranes with enhanced contaminant rejection. Tested membranes on cross-flow filtration systems and characterized membrane cross-sections via transmission electron microscopy (TEM).

Employed nanoparticles in the production of thin-film nanocomposite membranes (TFNs). Optimized

zeolite TFN fabrication methods and evaluated the impacts of fabrication variables on TFN membrane performance using cross-flow and dead-end filtration systems. Utilized ultra-performance liquid chromatography-tandem mass spectrometry (UPLC-MS/MS), high-performance liquid chromatography with ultraviolet detection (HPLC-UV), ultraviolet-visible spectroscopy (UV-Vis), and conductivity probes to assess the efficacy of contaminant (caffeine, carbamazepine, atrazine, atenolol, DEET, trimethoprim, boron, and salt) rejection by TFNs. Evaluated the feasibility of employing TFNs in water reuse applications to produce potable water. Characterized TFN polyamide active layers using Rutherford backscattering spectrometry (RBS).

Programmed and operated laboratory robotics in the Compound Management Division of a pharmaceutical company, helping to advance proprietary drug candidates that targeted cystic fibrosis and hepatitis C. Troubleshot equipment malfunctions and coordinated instrument QC methods.

Investigated the effects of weather events and runoff on water quality of a slough adjacent to a golf course. Performed fieldwork analyzing oxygen content, temperature, pH, and turbidity at several points throughout the slough over the course of a year. Assessed seasonality of water quality parameters.

Additional Education & Training

Science Communication Ambassador. Morehead Planetarium & Science Center, 2017

Peer Reviewer

External reviewer for The National Academies of Sciences, Engineering, and Medicine report - Graduate STEM Education for the 21st Century