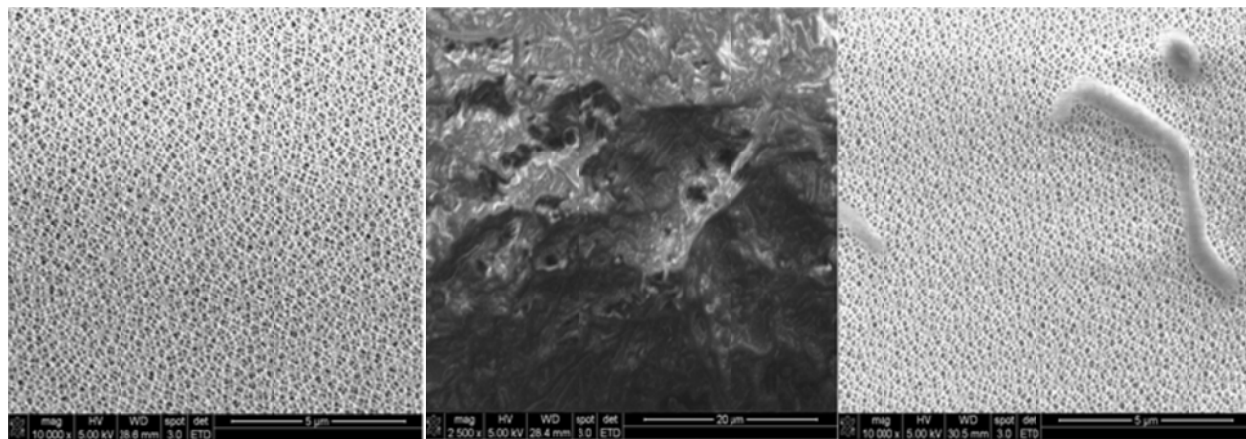


Dr. Paula Mouser, Assistant Professor in the Department of Civil, Environmental and Geodetic Engineering at the Ohio State University together with Professors Linda Weavers and Henk Verweij progressed toward completion of an Ohio Water Resources Center funded project via a joint Office of Energy and Environment at OSU and OWDA subaward. The overall objective of their project titled **“Characterizing the influence of surface chemistry and morphology on biofilm formation of ceramic membranes in wastewater treatment”** is to better characterize biological fouling of membranes used for water and wastewater treatment, and identify innovative cleaning technologies or improvements in membrane sciences to help prevent or reduce the rate of biological fouling.

Initial measurements indicate that only 10% of the total proteins pass through the membrane, with 90% retention on the membrane surface and within the pores. Polysaccharides, on the other hand, more readily pass through the membrane, with only about 50% of these being retained by the membrane. Results of preliminary ultrasonic cleaning experiments indicate biologically-fouled layers are effectively cleaned from ceramic membranes, although some remnant matter remains on the membrane following cleaning (Figure 1). Although initial cleaning of ceramic membrane surfaces by means of ultrasonic cavitation looks promising, there are considerations for long-term cleaning effectiveness to be made. Certain components of biological fouling layers may persist and be difficult to remove with ultrasonic cleaning. This hypothesis has become evident based on experiments assessing repeated fouling and cleaning procedures. Initial cleaning recoveries are typically 90% or higher, with subsequent cleanings declining in their initial membrane flux when compared to a clean membrane surface. Our goal will be to better quantify the biological components resistant to ultrasonic cleaning in order to develop cleaning or preventative maintenance strategies to specifically target these constituents.



**Figure 1** Scanning electron microscope (SEM) images of a clean ceramic membrane surface (left), a fouled membrane after wastewater filtration (middle), and the surface of a ceramic membrane following cleaning with ultrasound at 620 kHz for 30 seconds (right).

Principle Investigator: Dr. Paula Mouser is investigating the role that microorganisms play in mediating biochemical reactions in environmental systems using biotechnology methods. Her focus has been on deciphering the complex relationship between bio-physio-chemical processes in subsurface environments impacted by waste disposal activities and industrial processes. Applications of such research include improving detection and remediation strategies for the protection of water resources, and optimizing restoration activities for contaminated sites.