Dr. Pelagia-Iren Gouma, a Materials Science Engineering Professor in the College of Engineering at Ohio State, completed an Ohio WRC funded project via Office of Energy and Environment titled **"Composite Membranes for Produced Water Clean-up"**. The goal of the project was to study innovative water treatment technologies that can make removal of metals and radionuclides from fracking wastewater cost effective and scalable.

Within Ohio, hydraulic fracturing, or fracking continues to be a common method for energy production in which oil or gas is extracted from rock and shale formations by drilling and injecting high-pressure water and chemicals into wells. This process uses millions of gallons of water and leaves the wastewater produced filled with salts, proprietary industrial chemicals, radionuclides, and toxic metals. Properly cleaned produced water could be highly valuable, and it will reduce concerns about the use of large amounts of water in the fracking process.

*Figure 1 Milind Pawar, graduate student, demonstrating production of amyloid fibrils for membrane synthesis*

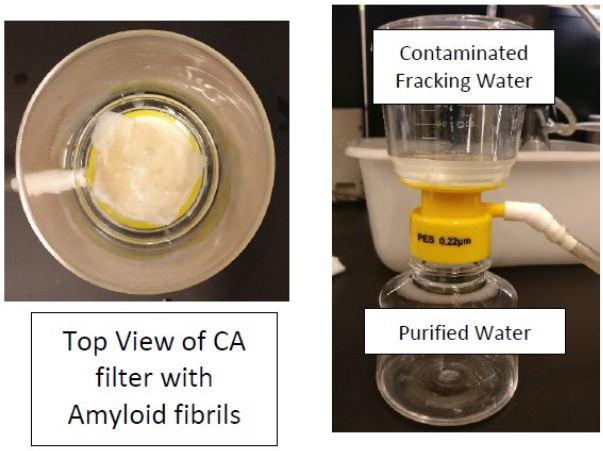


*Figure 2 Cellulose Acetate membrane with amyloid fibrils assembled to filter produced water in lab experiment*

Celulose acetate filters have been shown previously as superior oil absorbants. Dr. Gouma and her team have reached two major breakthroughs in membrane development for produced water treatment: (i) they managed to extract amyloid fibrils from wheat by-products and (ii) they have successfully managed to encapsulate amyloid fibrils into non-woven mats of cellulose acetate via a single step process of electrospinning. They are working on evaluating the assembled membrane capability to treat produced wastewater from hydraulics fracturing. Due to the affordable nature of the membrane constituents and the potential for it to efficiently remove toxic metals and radionuclides via filtration, this technology could be of significant use in addressing water pollution issues, such as fracking wastewater.

Researcher Profile: Dr. Perena-Iren Gouma is the Edward Orton, Jr., Chair in Ceramic Engineering. Gouma has a joint position as professor of materials science and engineering and professor of mechanical and aerospace engineering and will join The Ohio State University. She is director of the Advanced Ceramics Research Laboratory at Ohio State.