Dr. Isabel Escobar, Professor in Chemical and Environmental Engineering at the University of Toledo recently completed a project titled "**High-performance porous polybenzimidizole membranes for water treatment using forward osmosis**" funded by the Ohio Water Resources Center via OWDA subaward. Polybenzimidazole (PBI) is a material with excellent chemical resistance, and thermal and mechanical stability that might transform the current forward osmosis technology that has the potential to achieve up to a 75 percent decrease in costs and energy consumption compared to current reverse osmosis processes. When applied for desalination and wastewater reuse, this would enable a new resource for fresh water availability, satisfying both economic and environmental concerns.

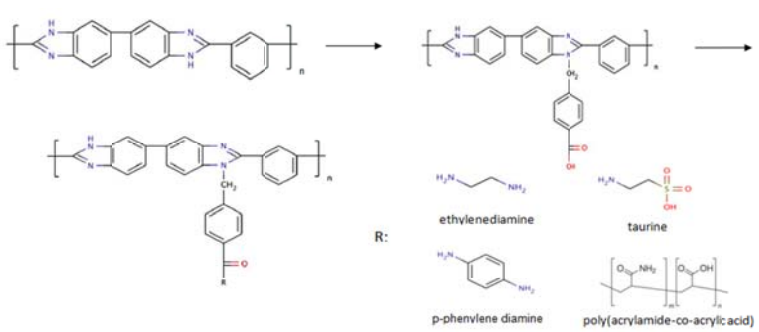

Figure 1 Chemistry for two-step modification procedure.

The focus of Dr. Escobar's study was to investigate the performance of the functionalized flat sheet PBI membranes (Figure 1) in a forward osmosis application. The results of PBI surface functionalization with the intent to increase hydrophobicity, increase surface charge, and decrease the membrane pore size show enhanced membrane performance both with respect to water flux and salt rejection (Figure 2). The reduced pore size coupled with the use of a feed stream carrying divalent or larger ions mixed with colloidal particles may have the ability to yield excellent results and high purity water.

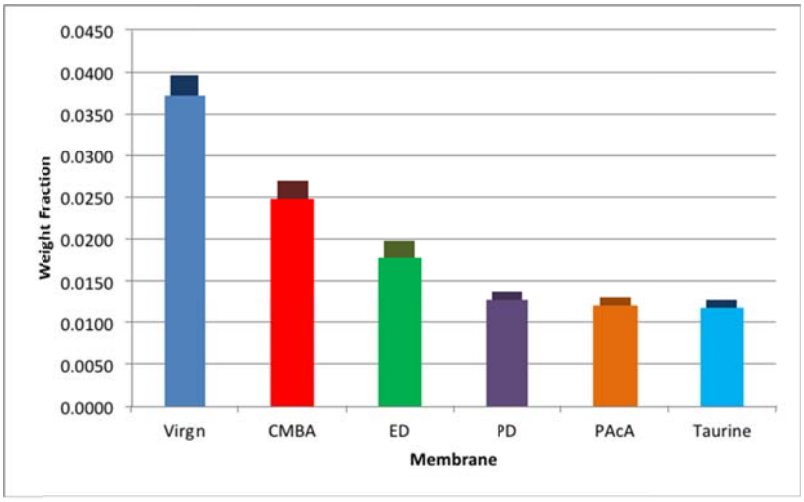

Figure 2 Total salt (back, thin bar) and sodium chloride (front, thick bar) weight fractions for each membrane.

Researcher: Dr. Escobar's research focuses on developing and/or improving polymeric membrane materials for water/wastewater treatment and water reuse operations through membrane post-synthesis modifications, the use of dynamic membranes, and process modifications.