

1) Qiang Wei and Cassandra Sanchez examine membrane materials at NMT; 2) Co-lead Frank Huang explains the PRO process; 3) Oil fields in southeast New Mexico

OSMOTIC POWER DEVELOPMENT

Produced water refers to water generated as a byproduct of drilling for oil and gas. New Mexico alone generates about 28 billion gallons of produced water annually, and most of it is discarded as wastewater due to the high concentration of inorganic and organic matter in the water called total dissolved solids (TDS). The Osmotic Power team (now in collaboration with the Bioalgal and Uranium teams) is trying to cut down on discarded wastewater by using produced water to generate clean energy through a process called pressure retarded osmosis (PRO). The Osmotic team continues its collaboration with the Apache Corporation to obtain high TDS water for analysis and testing in the PRO system.

In Year 2, the Osmotic team is nearing completion and implementation on design and fabrication of hollow fiber membranes (HFM), a key component of the PRO system that increases the efficiency of the PRO process. The team assessed the design requirements of the membranes and developed technical performance metrics and benchmarks. Effects of parameters, such as salt rejection and water flux, on the quality and performance of the membranes were also studied.

The team collaborated with California company Trevi Systems, and gained new knowledge about how to produce clean water from brackish water or wastewater at a lower cost and lower energy use. Optimization of the membrane materials continues, and selected designs will be prototyped using a custom-made 3D printer. Working prototypes may be adopted by Trevi Systems in the future.