Joint research aims to cut the cost of desalinating seawater

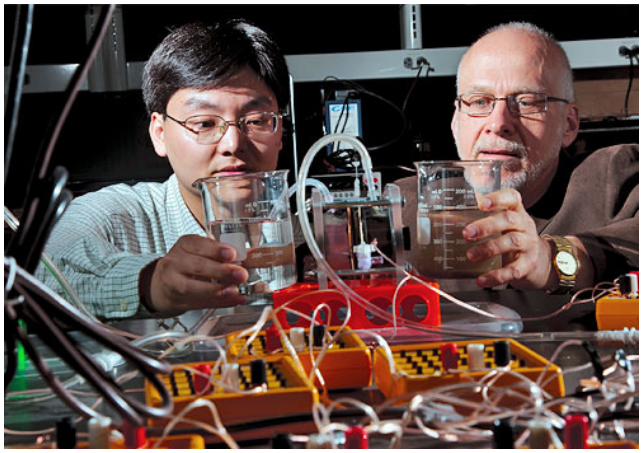
A research partnership between a UWM engineer and an international engineering consulting firm has formed around new energy-producing technology that could bring down the cost of removing salt from seawater.

An engineer in the Wisconsin office of Gannett Fleming Inc. found Zhen "Jason" He, a UWM assistant professor of engineering, while searching for an institutional partner to further advance the technology and bring it to market.

He is working on making the technology, called a "microbial desalination cell" (MDC), more viable for commercial use. The MDC performs three functions at once: producing energy from wastewater while also purifying it, and desalinating a separate supply of seawater.

The partnership is the second formal research collaboration between a water-related business and a UWM faculty member since the creation of UWM's graduate-level School of Freshwater Sciences just under a year ago. He has filed a patent on his design with the UWM Research Foundation.

It's important to a company like Gannett Fleming, which designs and builds water and wastewater treatment plants, says David Drew, a project manager with the company. The cost of energy, he says, is the reason desalination is so expensive.



UWM engineer Zhen "Jason" He (left) and David Drew with Gannett Fleming Inc. are working on research aimed at cutting the cost of desalination.

In fact, says He, the energy from the MDC can drive its own desalination process. "It won't do the job entirely, but it can act as an energy-saving pretreatment for saltwater," says He. "That would greatly improve efficiency while holding down costs."

Scaling up

Wastewater contains energy waiting to be harnessed, says Drew. "So the water and the energy are both addressed with this research."

He's lab members are increasing the size and scope of the prototype they began with, which was small enough to fit in the palm of the hand and could only process 60 milliliters of wastewater at a time.

"Dr. He's lab was the only one that had a good solution for scaling up the operation," says Drew, "so that it gives you the necessary energy recovery while also the sustainability of recycling the wastewater. We did a fair amount of due diligence to determine where best to put our investment."

The reactor itself is a three-chambered device in which microbes feed on the organics in the wastewater of one chamber, causing removal of ions from saltwater in an adjacent chamber. The metabolic energy created by the microbes also is the catalyst that produces the current.

Building a business

So far, the partnership has produced a larger reactor, Gannett Fleming has funded a second year of collaboration and the company has joined the Milwaukee Water Council. They are now investigating the reactor's commercial viability.

In designing a business plan, they started with a wide spectrum of possible applications for the work and winnowed it down to identify the specific market niche they wanted to target. "That helped us focus very quickly," says Drew, who has both a bachelor's and a master's degree in applied math and physics, and engineering, from UWM.

It's not just the financial support from Gannett Fleming that's important to his lab, says He. "Being an academic, I know very little about industry standards. This way, we can benefit each other."

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