A home fit for microbes

Approximately eight years ago, American engineer Fatemeh Shirazi saw the critical need for something different to deal with pollutants in water and wastewater. She felt it was time for a leap forward: utilities were taking a shotgun approach to wastewater treatment, and someone needed to develop a sniper solution targeted to the removal of specific pollutants.

Her solution, a platform technology called MicroNiche Engineering by company Microvi, has been successfully tested in the US and now is about to be tested on a major scale in the Australian market.

The most popular methods today remain the century-old activated sludge plant and the membrane bioreactors that were commercialised in the 1980s. These methods house a much greater portion of unproductive microorganisms than effective ones. The unwanted guests create a number of efficiency issues: competition for resources and environmental stresses shorten the lifespan of effective microorganisms, limiting performance and requiring large volume reactors to compensate for low organism density.

Microvi's solution is a biocatalyst composite, a porous polymer matrix that creates a natural habitat to enhance selected microorganism communities. Once cultivated in the lab, a high density of microorganisms and advanced materials are fabricated into a matrix the size of a rice bubble, called a biocatalyst. These biocatalysts can be used in new or retrofitted plants to achieve higher standards than today's water or wastewater treatment processes, more efficiently. By effectively eliminating unproductive competition, the technology is able to increase the key microorganism's stability and longevity, reduce energy and chemicals and minimise sludge, while leaving a fraction of the ecological footprint produced by activated sludge (10–15%) or membrane technology (50%).

A year ago, Microvi partnered with global engineering firm MWH Global to enter into Australia and Asia Pacific markets.

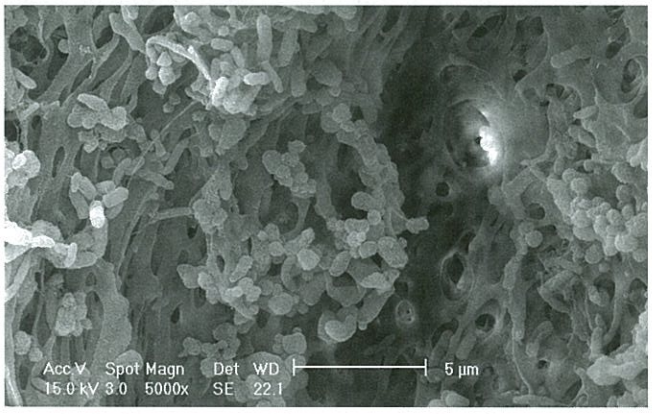
"In Australia, nitrates and phosphates are a big concern for us – we have very low levels of nutrients in our environment," MWH Global Management Consulting Director John Darmody said.

"Treating wastewater to reduce the concentration of nutrients has always been both a concern and a challenge in the Australian water industry."

There are at least two interested parties, with potentially more in the pipeline, as uses extend to water purification and bio-based chemical production.

"One of the big water utilities in Australia is installing a demonstration plant for nitrate removal in the first quarter of this year," Darmody said.

"We also have one of the premiere industrial food and beverage companies in Australia on board. In the next few months, MWH will be fitting out an entire plant with the Microvi technology on a full scale." ■



Microvi technology is a biocatalyst composite, a specially engineered super porous polymer matrix that creates a natural habitat to enhance selected microorganism communities.

The drinking water plant in Pasadena, California, had the Microvi system installed for nitrate removal as a pilot demonstration.

Case Study

A 4MGD (16ML/d) drinking water plant in Pasadena, California, affected by nitrate at 45 parts per million (ppm) and TOC 17ppm had the Microvi system installed for nitrate removal as a pilot demonstration. The system was designed with the MB-N2 biocatalyst reactor with the influent of 40ppm NO_3-, and a target of less than 2ppm NO_3- effluent. As a result, the nitrate was reduced from 40ppm to below the maximum contaminant level, no sludge was produced, and the biocatalysts received National Sanitary Foundation (NSF) 61 certification for drinking water.