New membrane system promises industrial wastewater breakthrough

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A new pilot plant to treat industrial wastewater is being built that could potentially reduce the amount of liquid waste by over 90 per cent.

The new plant, which will be located at a semiconductor company in Singapore can also recover precious metals from the treated water which can then be sold and reused.

The plant is being built jointly by the Separation Technologies Applied Research and Translation (START) Centre, a national-level facility to develop and commercialise innovative separation and filtration technologies, and Memsift Innovations Pte Ltd, a water technology firm specialising in zero-liquid discharge water treatment systems.

The pilot plant uses a novel water treatment system that leverages a new type of hollow-fibre membrane invented by Professor Neal Chung at the National University of Singapore, which has been assigned to and scaled up for industrial application by the START Centre.

Unlike a typical hollow-fibre membrane, which resembles noodles with a hollow core like a straw, the new tri-bore hollow-fibre membrane invented by Prof Chung has three hollow cores, allowing for a water flow rate which is about 30 per cent higher.

Under a new research partnership and licensing agreement, START Centre and Memsift Innovations will jointly build the wastewater treatment plant with the tri-bore hollow-fibre membranes, which can treat up to 5,000 litres per day for a semiconductor firm.

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This pilot plant is expected to help the firm save up to 1.6 million litres of water a year (2/3 of an Olympic-sized swimming pool), resulting in a saving of $250,000 (£190,000) in disposal cost. It will filter over 90 per cent of wastewater into clean water and concentrate the metal waste into a liquid, which can then be sold to other companies.

The current solution practised by the semiconductor factory is to transport the toxic wastewater produced during their manufacturing to a wastewater disposal facility where it is incinerated. This disposal process uses five times the energy cost of the pilot membrane filtration plant.

Dr Adil Minoo Dhalla, Managing Director of START Centre, said: “This is the first successful licensing agreement achieved by the national-level centre since it started in 2016, which seeks to turn cutting-edge membrane research from Singapore’s universities into real products usable by multinational and local companies.

“This pilot plant marks the first of many local water innovations which START is translating for commercialisation. Using our cutting-edge membrane fabrication, module design and testing facilities, we are able to scale up novel technologies from Singapore’s institutes of higher learning rapidly and to test them in real-life environments to validate their commercial value.”

Dr J Antony Prince, Founder of Memsift Innovations, believes that the novel tri-bore hollow-fibre membrane from START Centre will help to improve the efficiency of their patent-pending thermal separation process, which provides unique benefits over traditional brine treatment and zero-liquid discharge solutions.

“Our filtration process operates at relatively low pressures and temperatures as compared to the conventional thermal-based separation processes. It saves energy, reduces operational cost, recovers precious metal and resources, while helping to save the environment,” explains Dr Prince.

Other advantages offered by Memsift Innovations include a very high water recovery at a minimum energy consumption, a small footprint for the treatment plants and minimum capital outlay for their clients.

This new pilot plant by START Centre and Memsift Innovations is expected to be commissioned in the second quarter of 2019.

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