University of Wollongong

Strategic Water Infrastructure Laboratory

Objective

A primary objective of the Strategic Water Infrastructure Laboratory at the University of Wollongong is the development of innovative membrane based purification technologies for water recycling and seawater desalination. Our laboratory is equipped with several customized bench scale and pilot scale membrane filtration systems capable of simulating realistic filtration conditions.

The Laboratory has a very robust analytical capability with a wide range of analytical instruments (examples include a Shimadzu TOC/TN Analyzer, a Shimadzu HPLC, a Shimadzu GC-MS, a Varian AAS, and a Beckman Coulter scintillation counter).

Trace level analysis at sub-nanogram per litre levels of a range of organic contaminants is also possible via existing collaboration with other research groups both internal and external to UOW. The Strategic Water Infrastructure Laboratory is currently undertaking several research projects funded by the Australian Research Council and directly by industry.

Case study

One of our current projects aims to optimise the process of nanofiltration (NF) and reverse osmosis (RO) filtration for indirect potable water recycling application.

NF and RO membranes play important roles in the production of high quality reclaimed water from which trace contaminants are to be removed. Recent research work conducted by our laboratory has systematically revealed that membrane fouling and cleaning can significantly influence the removal of trace organics by NF/RO membranes.

The results have significantly improved our understanding of the removal of trace contaminants by NF/RO membranes and thus can facilitate the optimisation of NF/RO treatment process, as well as for the identification and, subsequently, the mitigation or elimination of risk associated with various water recycling options.

The future

Further research effort has been directed toward the development of a novel membrane distillation (MD) process for the treatment of NF/RO concentrate produced by inland water recycling installations. MD has several advantages compared to conventional thermal distillation and reverse osmosis processes.

These include 100% (theoretical) rejection of ions, dissolved non-volatile organics, colloids, and pathogenic agents; lower operating temperatures than conventional distillation which can facilitate the utilization of waste heat; lower operating pressures than reverse osmosis membrane separation processes; reduced chemical interaction between membrane and process solutions; and less demanding membrane mechanical property requirements.

In addition, the unique ability of MD to utilize low grade heat source from industry (which may otherwise be wasted) or solar thermal energy provides an excellent platform for a greenhouse neutral desalination process.

More information

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