

AQUAPORINS (AQP)-BASED BIOMIMETIC MEMBRANES FOR WATER REUSE AND DESALINATION

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Key Words: Aquaporins, bio-mimetic membrane, fabrication, water application.

Aquaporins (AQPs) are biological proteins that form selective natural water channels. They have received increasing attention because of their high water permeability (each water channel can pass $\sim 10^9$ water molecules per second) and superior selectivity (i.e., the water channel only allows water passage while fully rejecting solutes).

Over the past several years, many efforts have been devoted to developing AQP-based biomimetic membranes (ABM). Excitingly, this concept has been proven in the laboratory recently. AQPs have been demonstrated to be able to increase the water flux of RO flat sheet membranes when incorporated into the selective layer of the membrane. The commercialization of the AQP-based biomimetic membranes has also been initiated. However, the practical application of AQP-based biomimetic membranes still faces many challenges. For example, the long-term stability of the aquaporin-based biomimetic (ABM) membrane is not clear. In addition, further R&D efforts are needed to further improve the performance of AQP-based biomimetic membranes. In this presentation, we will report the latest development of AQP-based biomimetic membranes in hollow fiber configuration at Singapore Membrane Technology Centre, and the investigation on ABM's stability and long-term reverse osmosis (RO) performance.

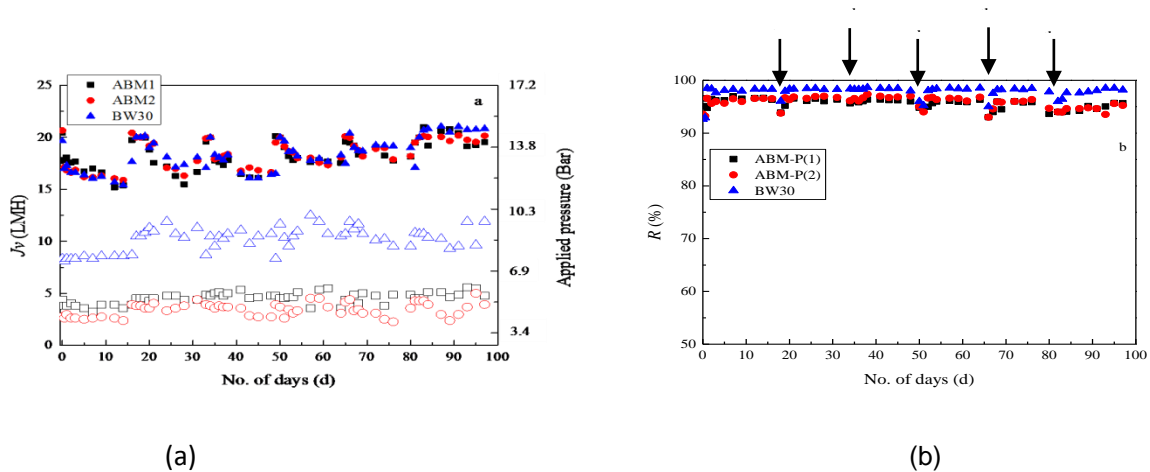


Fig.1 (a) Water flux behaviour and (b) overall rejection of ABM membrane and BW30 membrane by using real wastewater as feed solution. Testing conditions: real RO feed as feed solution, cross flow rate is 10 cm/s and applied pressure from around 3 to 15 bar at $28 \pm 1^\circ\text{C}$.