

Carbon nanotube based composite membranes for water desalination by membrane distillation

Ludovic Dumée^{a,b*}, Kallista Sears^a, Jürg Schütz^a, Niall Finn^a, Mikel Duke^b, Stephen Gray^b

^aCSIRO Materials Science and Engineering, Bayview Ave, Clayton Vic 3168, Australia

^bVictoria University Werribee Campus, Hoppers Lane, Werribee PO Box 14428 Melbourne, Victoria, 8001, Australia
Tel. +61 (3) 9545 2107; Fax +61 (3) 9545 2363; email: ludovic.dumee@csiro.au, kallista.sears@csiro.au

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ABSTRACT

New technologies are required to improve desalination efficiency and increase water treatment capacities. One promising low energy technique to produce potable water from either sea or sewage water is membrane distillation (MD). However, to be competitive with other desalination processes, membranes need to be designed specifically for the MD process requirements. Here we report on the design of carbon nanotube (CNT) based composite material membranes for direct contact membrane distillation (DCMD). The membranes were characterized and tested in a DCMD setup under different feed temperatures and test conditions. The composite CNT structures showed significantly improved performance compared to their pure self-supporting CNT counterparts. The best composite CNT membranes gave permeabilities as high as 3.3×10^{-12} kg/(m s Pa) with an average salt rejection of 95% and lifespan of up to 39 h of continuous testing, making them highly promising candidates for DCMD.

Keywords: Desalination; Nanotube; Bucky-paper; Composite material; Membrane distillation

* Corresponding author.