Chemosphere 353 (2024) 141108

Contents lists available at ScienceDirect

Chemosphere

journal homepage: www.elsevier.com/locate/chemosphere

The role of sheet-like TiO_2 in polyamide reverse osmosis membrane for enhanced removal of endocrine disrupting chemicals

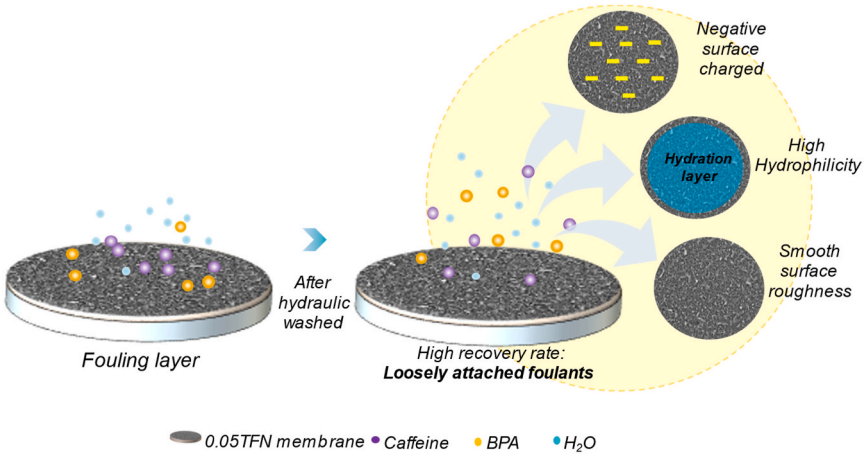
Nor Akalili Ahmad [a], Pei Sean Goh [a,*], Nur Alyaa Syfina Zakaria [a], Rosmawati Naim [b], Mohd Sohaimi Abdullah [a], Ahmad Fauzi Ismail [a,**], Norbaya Hashim [c], Nirmala Devi Kerisnan@Kerishnan [d], Nasehir Khan E.M. Yahaya [c], Alias Mohamed [d]

[a] Advanced Membrane Technology Research Centre (AMTEC), Universiti Teknologi Malaysia, 81310, Skudai, Johor, Malaysia
[b] Faculty of Chemical and Process Engineering Technology, Universiti Malaysia Pahang, 26300, Gambang, Pahang, Malaysia
[c] National Water Research Institute of Malaysia (NAHRIM), Lot 5377, Jalan Putra Permai, 43300, Seri Kembangan, Selangor, Malaysia
[d] Sewerage Service Department (JPP), Block B, Level 2 & 3, Atmosphere PjH No 2, Jalan Tun Abdul Razak, Precinct 2, 62100, Federal Territory of Putrajaya, Malaysia

HIGHLIGHTS

- Sheet-like TiO_2 was embedded in the PA layer of RO TFC membrane.
- The sheet-like TiO_2 created nanochannel to facilitate water transport.
- The sheet-like TiO_2 modified membranes exhibited enhanced flux and EDC rejection.
- The roles of sheet-like TiO_2 and EDC rejection mechanisms are elucidated.

GRAPHICAL ABSTRACT



ARTICLE INFO

Handling Editor. Am Jang

Keywords:
Endocrine disrupting chemicals
Thin film nanocomposite membrane
Caffeine
Bisphenol A
Titania nanosheet

ABSTRACT

Thin film composite (TFC) reverse osmosis (RO) membrane shows good promise for treating wastewater containing endocrine disrupting chemical (EDC) pollutants. The incorporation of functional materials with exceptional structural and physico-chemical properties offers opportunities for the membranes preparation with enhanced permselectivity and better antifouling properties. The present study aims to improve the EDC removal efficiency of TFC RO membrane using two-dimensional titania nanosheets (TNS). RO membrane was prepared by incorporating TNS in the dense layer of polyamide (PA) layer to form thin film nanocomposite (TFN) membrane. The TNS loading was varied and the influences on membrane morphology, surface hydrophilicity, surface

* Corresponding author.
** Corresponding author.
E-mail addresses: peisean@petroleum.utm.my (P.S. Goh), afauzi@utm.my (A.F. Ismail).

https://doi.org/10.1016/j.chemosphere.2024.141108
Received 28 September 2023; Received in revised form 15 December 2023; Accepted 1 January 2024
Available online 27 February 2024