17th International Conference on Inorganic Membranes
New Frontiers for Inorganic Membranes
July 1 - 5, 2024
Oceania Convention Center - Florianópolis - Brasil

Preparation of a composite NF rGO-TiO_2-pPD membrane deposited on low-cost ceramic support: Application for dye removal

Y. Kouzi[a,b (*)], Z. Chafiq Elidrissi[a], A. Essate[a], B. Achiou[a], S. Alami Younssi[a (*)], M. Rabiller-Baudry[b], M. Bouhria[a], M. Ouammou[a]

[a] Laboratory of Materials, Membranes and Environment, Faculty of Sciences and Technologies of Mohammedia, Hassan II University of Casablanca, Morocco

[b] Univ Rennes, CNRS, ISCR (Institut des Sciences Chimiques de Rennes) - UMR 6226, F-35000, Rennes, France

[*] saad.alamiyounssi@fstm.ac.ma; youness.kouzi-etu@etu.univh2c.ma

Abstract

Important notes:
Do NOT alter the structure of this form. Simply enter your information into it.

Given its exceptional qualities, graphene oxide (GO) has attracted a lot of interest in membrane technology, especially in water treatment. Nevertheless, its poor stability, swelling, and performance loss during filtration are still some major issues that still need to be resolved. This work aims to prepare a stable and more efficient GO-based nanofiltration (NF) layer disposed of on low-cost kaolinite support. The hydrothermal technique was used to produce titania oxide (TiO_2) nanoparticles, reduced graphene oxide (rGO) and rGO-TiO_2 intercalated sheets with different intercalation ratios which will provide the membrane with increased hydrophilicity enhancing water flux, selectivity and resistance to fouling. Following that, the rGO-TiO_2 was cross-linked with para-phenylenediamine (pPD) to achieve a tailored 3D membrane layer with increased stability and selectivity, preventing water molecules adsorbed in the interlayer spacing of GO from widening the distance and decreasing rejection. The prepared composite was coated on geomaterial support using grafting and evaporation-assisted assembly techniques while comparing two activations approaches. The prepared membrane showed enhanced stability while FTIR and XRD proved the successful preparation of TiO_2 and its intercalation between the rGO sheets. The filtration results showed that the combined interaction and cross-linking led to an improvement in the membrane performances as the permeability enhanced from 3.58 to 20.80 L h^{-1} m^{-2} bar^{-1} while the rejection of 50 ppm congo red solution passed from 78.7 to 99.3%.