Permeation, antifouling and desalination performance of TiO2 nanotube incorporated PSf/CS blend membranes.

ABSTRACT

Polysulfone (PSf) and chitosan (CS) blend membranes were prepared by incorporating titanium dioxide nanotubes (TiO2NT) in different compositions. The proper blending of PSf and CS in the PSf/CS/TiO2 membranes was confirmed by ATR-IR spectroscopy. The influence of nanotubes on morphology of membranes was investigated by Field Emission Scanning Electron Microscopy (FESEM). The effect of nanotubes on hydrophilicity of the membranes was studied by water swelling and contact angle measurements. The distribution of TiO2NT on the membrane surface was determined by Transmission Electron Microscope (TEM) analysis. The permeation property of PSf/CS/TiO2NT membranes was carried out by measuring the time dependent pure water flux (PWF). Bovine serum albumin (BSA) protein rejection studies were performed to know the antifouling properties. The rheological percolation threshold of PSf/CS/TiO2NT solutions was measured by viscosity studies. The nanotubes incorporated PSf/CS membranes showed enhanced permeation and antifouling properties compared to PSf/CS and nascent PSf ultrafiltration membranes. Membranes prepared well above rheological percolation threshold showed drastic reduction in pore size and acted as nanofiltration (NF) membranes.