Characterization and antifouling performance of negatively charged PES/mesoporous silica ultrafiltration membrane for raw water filtration

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ABSTRACT

Ultrafiltration (UF) has become one of the best technologies in the surface water treatment due to the increasing strict regulations for drinking water quality. However, the low rejection for the natural organic matter (NOM) and the membrane fouling restrict its wider application. In this study, polyethersulfone (PES) UF membranes modified by mesoporous silica (MS) particles were fabricated by phase inversion process and their surfaces were further negatively charged. The separation properties and antifouling performances of the modified membranes were investigated. Results indicated that the negatively charged modification could be an effective way for better removal of NOM and reduction of the membrane fouling. The foulant amount on the pure PES membrane after filtration of the raw water could reach to 0.032 mg/cm², however, it decreased to 0.011 mg/cm² for nPES/MS membrane. The raw water purification experiments exhibit that the membrane could maintain a relative high flux and the rejection for the NOM over 99% throughout the whole experiment, which indicates that the nPES/MS membranes could be successfully applied in the raw water filtration.

Keywords: Antifouling; Ultrafiltration; Negatively charged; Water treatment

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