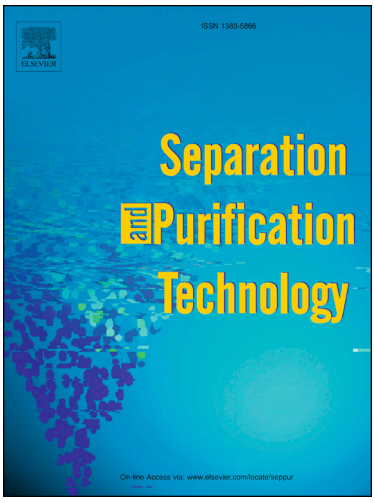

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A facile approach for preparation of positively charged nanofiltration membranes by in-situ crosslinking between polyamide-imide and polyethylenimine

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ABSTRACT

Polyamide-imides (PAI) are attractive materials for membrane formation due to their high chemical and thermal stability. In this study, we report a facile approach for preparing positively charged nanofiltration (NF) membranes using a one-step process. Polyethylenimine (PEI) was dissolved in a coagulation bath and formed in-situ ionic crosslinking with PAI during phase inversion. The membranes were characterized by attenuated total reflectance Fourier Transform Infrared spectroscopy **(ATR-FTIR)**, scanning electron microscopy **(SEM)**, **energy dispersive x-ray analysis (EDX)**, atomic force microscopy **(AFM)**, contact angle and zeta potential measurements. The most positively charged membrane was obtained when the pH of the coagulation bath was adjusted to 10. This membrane showed a significant decrease in contact angle and surface roughness and increase in the pure water permeability (PWP) compared to the plain PAI membrane. The salt rejection performance of the crosslinked PAI membrane was measured using $MgCl_2$, $CaCl_2$, NaCl and Na_2SO_4 salts. The rejection of Mg^{2+} and Ca^{2+} ions was found to be 95.6% and 90.2%, respectively. The crosslinked membrane showed excellent chemical stability when stored in HCl solution at pH 3 up to 7 days. **Antifouling behaviour of the optimized membrane was tested using bovine serum albumin (BSA) and flux recovery ratio of the membrane was found to be 92.2% at the end of 3 hours filtration.** The results suggest that the positively charged PAI membranes crosslinked with PEI may have a potential in recovering valuable cationic metals from acid mine wastewater.

Key words: Polyamide-imide, polyethylenimine, in-situ crosslinking, positively charged nanofiltration membrane, phase inversion

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