

## Synthesis and optimization of co-polymerized graphene oxide spin-coated over nylon for efficient water desalination

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Received 29 August 2018; Accepted 4 January 2019

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### ABSTRACT

Freshwater is indeed the main need of humans which can be prepared from saline water sources. Herein, in order to prepare an optimized nanocomposite membrane, graphene oxide (GO) nanosheets were cross-linked by N-isopropylacryl amide (NIPAM) and N,N-methylenebis (acrylamide) monomers in the presence of ammonium persulfate. In following, the cross-linked GO which had lower spacing between nanosheets and higher hydrophilicity, was spin coated on nylon substrate with two different pore sizes. During the synthesis procedure, effects of factors including pore size of nylon substrate, GO loading%, and draw solution concentration on desalination performance were studied. To characterize the prepared samples, FESEM, AFM, and X-ray diffraction methods were used. Desalination performance of the membranes was studied through forward osmosis and dead end processes. The results showed that by increasing the GO loading, desalination performance is enhanced. Furthermore, it was observed that the nylon substrates possessing larger pores are more suitable for desalination of draw solutions with higher NaCl concentration. The significantly better desalination performance of the GO cross-linked nanocomposite on nylon can be attributed to its optimized interlayer spacing and higher hydrophilicity.

*Keywords:* Desalination; Graphene oxide; Tuning the GO d-spacing; Nylon; Forward osmosis

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