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PII: S0376-7388(16)32441-3
DOI: http://dx.doi.org/10.1016/j.memsci.2017.04.043
Reference: MEMSCI15207

To appear in: *Journal of Membrane Science*

Received date: 5 December 2016
Revised date: 16 April 2017
Accepted date: 21 April 2017

Cite this article as: Peng Wen, Yingbo Chen, Xiaoyu Hu, Bowen Cheng, Dongqing Liu, Yufeng Zhang and Sankar Nair, Polyamide Thin Film Composite Nanofiltration Membrane Modified with Acyl Chlorided Graphene Oxide *Journal of Membrane Science,* http://dx.doi.org/10.1016/j.memsci.2017.04.043

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Abstract

In order to reach both high water permeability and high ion rejection, a thin-film composite nanofiltration membrane (PA/GO-COCl) with acyl chlorided graphene oxide (GO-COCl) embedded in polyamide (PA) layer was fabricated by interfacial polymerization of piperazine and trimesoyl chloride. GO-COCl was synthesized by acyl chloride reaction with graphene oxide and then added into a nonpolar organic (hexane) phase using 2% ethanol as dispersant. The surface morphologies and chemical structures of the modified membranes were observed by scanning electronic microscopy, atomic force microscopy, X-ray photoelectron spectroscopy and FTIR spectroscopy. Water flux of the PA/GO-COCl membrane increased from 11.6 to 22.6 $L \cdot m^{-2} \cdot h^{-1}$, and salt rejection of Na_2SO_4 increased from 95.0% to 97.1%, compared with those of the pristine PA membrane. Enhanced performances of the PA/GO-COCl membrane were attributed to the incorporation of laminated graphene oxide sheets, which decrease effective thickness of the active layer and keep the layer intact for high rejection rate. This graphene oxide

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