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www.elsevier.com/locate/memsci

PII: S0376-7388(18)30131-5
DOI: https://doi.org/10.1016/j.memsci.2018.02.062
Reference: MEMSCI15987

To appear in: *Journal of Membrane Science*

Received date: 16 January 2018
Revised date: 26 February 2018
Accepted date: 26 February 2018

Cite this article as: Yao Wang, Zhi Wang and Jixiao Wang, Lab-Scale and pilot-scale fabrication of amine-functional reverse osmosis membrane with improved chlorine resistance and antimicrobial property, *Journal of Membrane Science,* https://doi.org/10.1016/j.memsci.2018.02.062

Lab-Scale and pilot-scale fabrication of amine-functional reverse osmosis membrane with improved chlorine resistance and antimicrobial property

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Abstract:

Enhancing membrane flux, rejection, antimicrobial and chlorine resistance has been the focus of reverse osmosis membrane research. The permselectivity, chlorine resistance and antimicrobial properties of a polyamide (PA) membrane were improved by immobilization of self-synthesized amine functional hydantoin derivative poly(3-allyl-5,5-dimethylhydantoin-co-vinylamine) (P(ADMH-co-VAm)). The chlorine resistance and antimicrobial property of the modified membrane could be regenerated due to the reversible transition between hydantoin and N-halamine. The lab-scale virgin and modified membranes were systematically characterized, and their performances were evaluated and compared with some representative commercial membranes. The modified membrane showed similar permselectivity, but higher and regenerable chlorine resistance and antimicrobial property as compared with the commercial membrane e.g., BW30FR. Next, a pilot-scale 0.4-m wide continuous membrane production process was performed to fabricate membrane element. The