Desalination and Water Treatment
www.deswater.com

doi:10.5004/dwt.2018.22478

116 (2018) 19–28
June

Enhancement in permselectivity and antibacterial performances of polyamide RO membranes via surface modification of AgCl nanoparticles

Hao Li, Dongbing Cheng*, Lingyao Dong, Feng Qian

Changjiang River Scientific Research Institute, Huangpu Street, Wuhan 430072, PR China, Tel. +86 18064111112, Fax +86-27-82920797, email: haol@whu.edu.cn (H. Li), Tel. +86 13100625130, email: xiao2005zhu@163.com (D. Cheng), Tel. +86 15717160712, email: 34425685@qq.com (L. Dong), Tel. +86 15827408850, email: 402483315@qq.com (F. Qian)

Received 22 November 2017; Accepted 5 May 2018

ABSTRACT

Membrane fouling, especially bio-fouling, limits the further development of thin film composite (TFC) aromatic polyamide reverse osmosis (RO) membranes. In the current study, a simple method (the alternative soaking surface mineralization technique) was used to deposit AgCl particles onto surfaces of commercial RO membranes to enhance its antibacterial performance and permselectivity simultaneously. Scanning electron microscopy (SEM) and X-ray photoelectron spectroscopy (XPS) confirmed the deposition of AgCl particles on the surface of the modified membranes. Characterization of membrane surface showed the modification enhanced the hydrophilic of membrane surfaces, made the membrane surfaces more negatively charged and did not influence the membrane surface roughness. Under RO operation, the modification improved the membrane flux and salt rejection. Membrane fouling test showed the modified membranes had slower water flux decline rate and higher water flux recovery rate. Membrane antibacterial test showed the death rates of Escherichia coli after contacting with modified membranes were much larger than that after contacting with the unmodified membrane.

Keywords: Reverse osmosis membrane; Surface modification; AgCl; Anti-fouling; Antibacterial

*Corresponding author.