www.elsevier.com/locate/memsci

Asymmetric porous monovalent cation perm-selective membranes with an ultrathin polyamide selective layer for cations separation

Linxiao Hou, Bin Wu, Dongbo Yu, Simeng Wang, Muhmmad Aamir Shehzad, Rongqiang Fu, Zhaoming Liu, Qiuhua Li, Yubin He, Noor Ul Afsar, Chenxiao Jiang, Liang Ge, Tongwen Xu

PII: S0376-7388(18)30060-7
DOI: https://doi.org/10.1016/j.memsci.2018.04.022
Reference: MEMSCI16106

To appear in: *Journal of Membrane Science*

Received date: 9 January 2018
Revised date: 7 April 2018
Accepted date: 15 April 2018

Cite this article as: Linxiao Hou, Bin Wu, Dongbo Yu, Simeng Wang, Muhmmad Aamir Shehzad, Rongqiang Fu, Zhaoming Liu, Qiuhua Li, Yubin He, Noor Ul Afsar, Chenxiao Jiang, Liang Ge and Tongwen Xu, Asymmetric porous monovalent cation perm-selective membranes with an ultrathin polyamide selective layer for cations separation, *Journal of Membrane Science,* https://doi.org/10.1016/j.memsci.2018.04.022

Asymmetric porous monovalent cation perm-selective membranes with an ultrathin polyamide selective layer for cations separation

Linxiao Hou[a], Bin Wu[a], Dongbo Yu[a], Simeng Wang[a], Muhmmad Aamir Shehzad[a], Rongqiang Fu[a], Zhaoming Liu[b], Qiuhua Li[a], Yubin He[a], Noor Ul Afsar[a], Chenxiao Jiang[a], Liang Ge[a,c]*, Tongwen Xu[a]*

[a] CAS Key Laboratory of Soft Matter Chemistry, *iCHEM* (Collaborative Innovation Center of Chemistry for Energy Materials), Department of Chemistry, School of Chemistry and Materials Science, University of Science and Technology of China, Hefei 230026, P. R. China

[b] Key Laboratory of Charged Polymeric Membrane Materials of Shandong Province, Shandong Tianwei Membrane Technology Co., Ltd., The Hi-tech Zone, Weifang, Shandong, P. R. China

[c] Anhui Province Key Laboratory of Environment-friendly Polymer Materials, Anhui University, Hefei 230601, P. R. China

*Corresponding authors. E-mail: twxu@ustc.edu.cn, geliang@ustc.edu.cn; Tel: +86-551-63601581; Fax: +86-551-63602171

Abstract

Highly permeable and selective membranes are desirable for mono/divalent cations separation. Here, we report the fabrication of a novel monovalent cation perm-selective membrane (MCPM) for selective cations separation *via* electrodialysis. The selective layer was fabricated *via* interfacial polymerization of ethylenediamine, tetraethylenepentamine and polyethyleneimine with 1,3,5-benzenetricarbonyle trichloride on the hydrolyzed polyacrylonitrile porous substrate. The negatively charged porous substrate and ultrathin polyamide selective layer could offer multidimensional channels for ions transport. In addition, the transport of large-sized Mg^{2+} was greatly intercepted by the compact polyamide selective layer, thus the perm-selectivity was significantly improved. High perm-selectivity ($P_{Mg^{2+}}^{Na^+}$=3.3) which is 94% higher than that of a commercial MCPM was obtained, meanwhile it maintained good Na^+ flux (J_{Na^+}=4.27 $\times 10^{-8}$ mol cm^{-2} s^{-1}) at a current density of 14 mA cm^{-2}. Furthermore, such unique structure also lead to high limiting current density and excellent long-term stability.