

Accepted Manuscript

Positively Charged Nanofiltration Membrane Fabricated by Poly(acid-base)
Complexing Effect Induced Phase Inversion Method for Heavy Metal Removal

Chunli Liu, Weihui Bi, Dongliang Chen, Suobo Zhang, Hongchao Mao

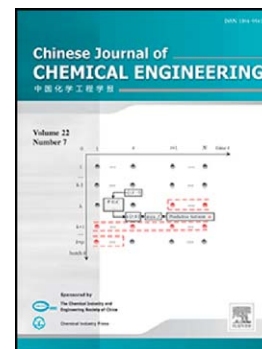
PII: S1004-9541(17)30095-2
DOI: doi:[10.1016/j.cjche.2017.06.001](https://doi.org/10.1016/j.cjche.2017.06.001)
Reference: CJCHE 832

To appear in:

Received date: 16 February 2017
Revised date: 1 June 2017
Accepted date: 2 June 2017

Please cite this article as: Chunli Liu, Weihui Bi, Dongliang Chen, Suobo Zhang, Hongchao Mao, Positively Charged Nanofiltration Membrane Fabricated by Poly(acid-base) Complexing Effect Induced Phase Inversion Method for Heavy Metal Removal, (2017), doi:[10.1016/j.cjche.2017.06.001](https://doi.org/10.1016/j.cjche.2017.06.001)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Positively Charged Nanofiltration Membrane Fabricated by Poly(acid-base) Complexing Effect Induced Phase Inversion Method for Heavy Metal Removal*

Chunli Liu^{1,2}, Weihui Bi¹, Dongliang Chen¹, Suobo Zhang^{1,3**}, Hongchao Mao^{1**}

¹Key Laboratory of Ecomaterials, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun 130022, China.

²University of Chinese Academy of Sciences, Beijing 100039, China.

³Jiangsu National Synergetic Innovation Center for Advanced Materials (SICAM), Jiangsu, China.

Abstract Poly(arylene ether ketone)s with carboxylic groups (PAEK-COOH) is a good membrane fabrication material, a kind of polyacids, while polyethylenimine (PEI) is a weak organic base, a kind of polybases. Those polyacids and polybases would form ionic complexation at the interface of two liquid phases. In this paper, PAEK-COOH/N-Methyl pyrrolidone (NMP)/1,4-dioxane (DO) mixture is employed as polymer casting solution and aqueous solution of PEI is used as coagulation bath, respectively. Then ion complexation induced phase inversion process is applied to prepare positively charged nanofiltration membrane with thinner, but denser separation skin layer. The complexing reaction at the interface of two liquid phases has great influence on the kinetic aspects of phase inversion process, which in accordance would affect the morphology and performance of membrane. The obtained membrane fabricated via the ion complexation induced phase inversion method is positively charged, has high water permeability and possesses high rejection towards divalent cations, such as Mg^{2+} , Ca^{2+} , Pb^{2+} etc., which could be used for removal heavy metals from pollutant water. At the optimal condition, the pure water flux of the PAEK-COOH-PEI nanofiltration membrane is $24.3 L \cdot m^{-2} \cdot h^{-1}$, with $MgCl_2$ rejection of 92.2%.

Keywords Polyelectrolyte complex, Carboxylated polymer, Polyethylenimine, Nanofiltration, Water purification

1 INTRODUCTION

Nanofiltration is a pressure driving membrane filtration process that features of low energy cost in water softening, food chemistry and pharmaceutical manufacturing and so on[1]. Nanofiltration membrane is defined to have pore diameters in the range of 1-2 nm, and molecular weight cut off (MWCO) for neutral solutes in the range of 150 Da to 2000 Da, which would penetrate appreciable monovalent ions, but reject specific divalent or multivalent ions that possess

* Supported by the National Basic Research Program of China (2015CB655302), the National Science Foundation of China (51133008, 51473163 and 51503199) and the Development of Scientific and Technological Project of the Jilin Province (20160101316JC).

Download English Version:

<https://daneshyari.com/en/article/6593283>

Download Persian Version:

<https://daneshyari.com/article/6593283>

[Daneshyari.com](https://daneshyari.com)