

Accepted Manuscript

Title: Amino-functionalized surface modification of polyacrylonitrile hollow fiber-supported polydimethylsiloxane membranes

Authors: Leiqing Hu, Jun Cheng, Yannan Li, Jianzhong Liu, Junhu Zhou, Kefa Cen



PII: S0169-4332(17)31004-8
DOI: <http://dx.doi.org/doi:10.1016/j.apsusc.2017.04.006>
Reference: APSUSC 35678

To appear in: *APSUSC*

Received date: 5-2-2017
Revised date: 25-3-2017
Accepted date: 2-4-2017

Please cite this article as: Leiqing Hu, Jun Cheng, Yannan Li, Jianzhong Liu, Junhu Zhou, Kefa Cen, Amino-functionalized surface modification of polyacrylonitrile hollow fiber-supported polydimethylsiloxane membranes, Applied Surface Science <http://dx.doi.org/10.1016/j.apsusc.2017.04.006>

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.

<AT>Amino-functionalized surface modification of polyacrylonitrile hollow fiber-supported polydimethylsiloxane membranes

<AU>Leiqing Hu, Jun Cheng* juncheng@zju.edu.cn, Yannan Li, Jianzhong Liu, Junhu Zhou, Kefa Cen

<AU>

<AFF>State Key Laboratory of Clean Energy Utilization, Zhejiang University, Hangzhou 310027, China

<PA>*Corresponding author: Prof. Dr. Jun Cheng, State Key Laboratory of Clean Energy Utilization, Zhejiang University, Hangzhou 310027, China. Tel.: +86 571 87952889; fax: +86 571 87951616.

<ABS-HEAD>Highlights ► Amino group was introduced to improve surface polarity of PDMS membrane. ► The water contact angle of PDMS membrane decreased after the modification. ► The concentration of N atom on surface of PDMS membrane reached up to ~6%. ► The density of PDMS membrane decreased while the swelling degree increased. ► CO₂ permeability increased while selectivity decreased after the modification.

<ABS-HEAD>Abstract

<ABS-P>This study aimed to improve surface polarity of polydimethylsiloxane (PDMS) membranes and provide surface active sites which were easy to react with other chemicals. 3-Aminopropyltriethoxysilane (APTES) containing an amino group was introduced into a PDMS membrane by crosslinking to prepare polyacrylonitrile hollow fiber-supported PDMS membranes with an amino-functionalized surface. Fourier transform infrared and X-ray photoelectron spectroscopic analyses proved the existence of APTES and its amino group in the PDMS membrane. The concentration of N atoms on the PDMS membrane surface reached ~6% when the mass ratio of APTES/PDMS oligomer in the PDMS coating solution was increased to 4/3. The water contact angle decreased from ~114° to ~87.5°, indicating the improved surface polarization of the PDMS membrane. The density and swelling degree of the PDMS membrane decreased and increased, respectively, with increasing APTES content in PDMS. This phenomenon increased CO₂ permeability and decreased CO₂/H₂ selectivity, CO₂/CH₄ selectivity, and CO₂/N₂ selectivity. When the mass ratio of APTES/PDMS oligomer was increased from 0 to 4/3, the CO₂ permeation rate of the hollow fiber-supported PDMS membranes initially decreased from ~2370 GPU to ~860 GPU and then increased to ~2000 GPU due to the change in coating solution viscosity.

<KWD>Abbreviation: PDMS, polydimethylsiloxane; APTES, 3-Aminopropyltriethoxysilane; UV, ultraviolet; TEOS, tetraethyl orthosilicate; PAN, Polyacrylonitrile; DBD, dibutyltindilaurate; FTIR, Fourier transform infrared; XPS, X-ray photoelectron spectroscopy; WCA, water contact angle;

Download English Version:

<https://daneshyari.com/en/article/5350936>

Download Persian Version:

<https://daneshyari.com/article/5350936>

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