

Author's Accepted Manuscript

Tailoring the nanophase-separated morphology of anion exchange membrane by embedding aliphatic chains of different lengths into aromatic main chains

Xiaoming Yan, Baolin Zhao, Jiafei Liu, Xinyue Zhang, Gaohong He



PII: S0376-7388(18)31397-8
DOI: <https://doi.org/10.1016/j.memsci.2018.07.022>
Reference: MEMSCI16301

To appear in: *Journal of Membrane Science*

Received date: 21 May 2018
Revised date: 9 July 2018
Accepted date: 10 July 2018

Cite this article as: Xiaoming Yan, Baolin Zhao, Jiafei Liu, Xinyue Zhang and Gaohong He, Tailoring the nanophase-separated morphology of anion exchange membrane by embedding aliphatic chains of different lengths into aromatic main chains, *Journal of Membrane Science*, <https://doi.org/10.1016/j.memsci.2018.07.022>

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 galley proof before it is published in its final citable 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.

Tailoring the nanophase-separated morphology of anion exchange membrane by embedding aliphatic chains of different lengths into aromatic main chains

Xiaoming Yan, Baolin Zhao, Jiafei Liu, Xinyue Zhang, Gaohong He*

State Key Laboratory of Fine Chemicals, Liaoning Province Engineering Laboratory of High Efficiency and Energy Saving Separation Technology in Petrochemical Industry, School of Petroleum and Chemical Engineering, Dalian University of Technology, Panjin, LN 124221, China

* Corresponding author: Tel.: +86 411 84986291; E-mail: hgaohong@dlut.edu.cn (Dr. Gaohong He)

Abstract

Tuning the hydrophilic/hydrophobic nanophase-separated morphology to enhance the conductivity is a considerable challenge in the field of anion exchange membranes (AEMs). Here, a series of novel aliphatic-aromatic copolymer AEMs were designed by embedding flexible alkyl chains of different lengths into rigid main chain of poly(ether sulfone). Compared to traditional aromatic polymer, the aliphatic-aromatic copolymers had more flexible main chains and longer hydrophobic segments, both of which promoted the nanophase separation and the formation of ionic clusters. Increasing aliphatic chain length made the ionic clusters larger and more interconnected, but too long aliphatic chain led to the formation of smaller ionic clusters because the ionic groups were far away from each other. An optimum length of the aliphatic chain (8 C) existed for the nanophase-separated morphology with the biggest ionic clusters (around 8 nm), with which the membrane showed the highest conductivity. A peak power density of 159 mW cm^{-2} was obtained for the cell incorporating the 8C membrane. Based on these, this study reveals a new direction to create a tunable nanophase-separated morphology for high-performance AEMs.

Keywords: anion exchange membrane, nano-phase separation, morphology

Download English Version:

<https://daneshyari.com/en/article/7019615>

Download Persian Version:

<https://daneshyari.com/article/7019615>

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