Construction of molecule-selective mixed matrix membranes with confined mass transfer structure

Weidong Li, Fusheng Pan, Yimeng Song, Meidi Wang, Hongjian Wang, Shalik Walker, Hong Wu, Zhongyi Jiang

PII: S1004-9541(17)30084-8
DOI: doi:10.1016/j.cjche.2017.04.015
Reference: CJCHE 820

To appear in:

Received date: 19 January 2017
Revised date: 7 March 2017
Accepted date: 26 April 2017

Please cite this article as: Weidong Li, Fusheng Pan, Yimeng Song, Meidi Wang, Hongjian Wang, Shalik Walker, Hong Wu, Zhongyi Jiang, Construction of molecule-selective mixed matrix membranes with confined mass transfer structure, (2017), doi:10.1016/j.cjche.2017.04.015

Construction of molecule-selective mixed matrix membranes with confined mass transfer structure☆

Weidong Li[1,2], **Fusheng** Pan[1,2,3], **Yimeng** Song[1,2], **Meidi** Wang[1,2], **Hongjian** Wang[1,2], **Shalik** Walker[1,2], **Hong** Wu[1,2,3], **Zhongyi** Jiang[1,2,3,*]

[1] Key Laboratory for Green Chemical Technology of Ministry of Education, School of Chemical Engineering and Technology, Tianjin University, Tianjin 300072, China.

[2] Collaborative Innovation Center of Chemical Science and Engineering (Tianjin), Tianjin 300072, China.

[3] Tianjin Key Laboratory of Membrane Science and Desalination Technology, Tianjin University, Tianjin 300072, China.

Abstract Extraordinary mass transfer phenomenon is usually found when the small molecules pass through a confined structure, whose effective size is commensurate with the mean free path of the molecules. Small changes in the confined mass transfer structure (including size, morphology and properties) will lead to significant fluctuations of the mass transfer coefficient. The mass transfer of the penetrant molecules in the dense membranes for pervaporation, gas separation and so on, is located in the scope of confined mass transfer. Incorporating nanofillers into polymer matrix to construct mixed matrix membranes (MMMs) is an effective approach to tune the confined mass transfer structure and enhance the performance of the widely used polymeric membranes. This review focuses on the construction and manipulation of the confined structure in the polymeric membranes *via* incorporating one-dimensional (1D), two-dimensional (2D) and three-dimensional (3D) fillers. The comparison of the MMMs for pervaporation is summarized, and the research prospective of the MMMs is provided.

Keywords membranes, pervaporation, separation, confined mass transfer structure, dimensional

☆ Supported by the National Natural Science Foundation of China (21490583 and 21621004), the National Science Fund for Distinguished Young Scholars (21125627), Tianjin Application Foundation and Research in Cutting-edge Technology Plan (15JCQNJC43300), the Programme of Introducing Talents of Discipline to Universities (B06006).

* Corresponding author.
E-mail address: zhyjiang@tju.edu.cn (Z.Y. Jiang).