www.elsevier.com/locate/memsci

Hydrophobic Alumina Hollow Fiber Membranes for Sucrose Concentration by Vacuum Membrane Distillation

Yi-Rui Chen, Liang-Hsun Chen, Chien-Hua Chen, Chia-Chieh Ko, Allen Huang, Chia-Ling Li, Ching-Jung Chuang, Kuo-Lun Tung

PII: S0376-7388(17)31722-2
DOI: https://doi.org/10.1016/j.memsci.2018.03.048
Reference: MEMSCI16042

To appear in: *Journal of Membrane Science*

Received date: 9 June 2017
Revised date: 8 January 2018
Accepted date: 19 March 2018

Cite this article as: Yi-Rui Chen, Liang-Hsun Chen, Chien-Hua Chen, Chia-Chieh Ko, Allen Huang, Chia-Ling Li, Ching-Jung Chuang and Kuo-Lun Tung, Hydrophobic Alumina Hollow Fiber Membranes for Sucrose Concentration by Vacuum Membrane Distillation, *Journal of Membrane Science,* https://doi.org/10.1016/j.memsci.2018.03.048

Hydrophobic Alumina Hollow Fiber Membranes for Sucrose Concentration by Vacuum Membrane Distillation

Yi-Rui Chen[a1], Liang-Hsun Chen[a1], Chien-Hua Chen[a], Chia-Chieh Ko[a], Allen Huang[a], Chia-Ling Li[b], Ching-Jung Chuang[c], Kuo-Lun Tung[a]*

[a]Department of Chemical Engineering, National Taiwan University, Taipei 106, Taiwan
[b]Material and Chemical Research Laboratories, Industrial Technology Research Institute, Hsinchu 310, Taiwan
[c]Department of Chemical Engineering and R&D Center for Membrane Technology, Chung Yuan Christian University, Taoyuan 320, Taiwan

*Tel: +886-2-33663027, Fax: +886-2-23623040, E-mail: kuolun@ntu.edu.tw

Abstract

Hydrophobic alumina hollow fiber membranes were first used for sucrose concentration in a vacuum membrane distillation (VMD) system. The alumina hollow fiber membranes were prepared using the combined phase inversion and sintering method and then grafted with FAS to impart hydrophobicity. The as-prepared hydrophobic alumina hollow fiber membrane had a high mechanical strength of 191 MPa, a high water contact angle of 140^{o} and a high liquid entry pressure of water of 5.0 bar. Fifty-two hydrophobic alumina hollow fibers were packed into a shell-and-tube module. To evaluate the sucrose concentration performance of the prepared membrane module, the effects of various parameters on the permeate flux, such as the feed flow rate, temperature, vacuum pressure and concentration, were investigated in the VMD system. In the batch sucrose concentration tests, an 8 L 10°Brix sucrose solution was successfully concentrated to 50°Brix by removing 6.4 L of

[1] These authors contributed equally to this work.