www.elsevier.com/locate/memsci

New Polyethersulfone (PESU) Hollow Fiber Membranes for CO_2 Capture

Wai Fen Yong, Tai-Shung Chung, Martin Weber, Christian Maletzko

PII: S0376-7388(17)33508-1
DOI: https://doi.org/10.1016/j.memsci.2018.02.008
Reference: MEMSCI15932

To appear in: *Journal of Membrane Science*

Received date: 13 December 2017
Revised date: 17 January 2018
Accepted date: 7 February 2018

Cite this article as: Wai Fen Yong, Tai-Shung Chung, Martin Weber and Christian Maletzko, New Polyethersulfone (PESU) Hollow Fiber Membranes for CO_2 Capture, *Journal of Membrane Science,* https://doi.org/10.1016/j.memsci.2018.02.008

New Polyethersulfone (PESU) Hollow Fiber Membranes for CO_2 Capture

Wai Fen Yong[1,2], Tai-Shung Chung[1,*], Martin Weber[3], Christian Maletzko[4]

[1]Department of Chemical & Biomolecular Engineering, National University of Singapore, 4 Engineering Drive 4, Singapore 117585, Singapore
[2]Department of Chemical Engineering, Xiamen University Malaysia, Jalan Sunsuria, Bandar Sunsuria, 43900 Sepang, Selangor Darul Ehsan, Malaysia
[3]Advanced Materials & Systems Research, BASF SE, RAP/OUB-B1, 67056 Ludwigshafen, Germany
[4]Performance Materials, BASF SE, G-PMF/SU-F206, 67056 Ludwigshafen, Germany
*Correspondence author. Tel: +65 6516 6645; fax: +65 67791936. chencts@nus.edu.sg (T.-S. Chung).

Abstract

Compared to cellulose acetate, silicon rubber, polysulfone, and polyimide, polyethersulfone (PESU) has received much less attention as a commercially viable material for gas separation membranes. This is because PESU has issues of low permeability but rapid physical aging behavior that limit its asymmetric hollow fiber membranes for gas separation applications. To overcome it, a new PESU was synthesized by replacing one diphenyl sulfone unit in the main chains with a bulky and rigid 1,2,4-trimethylbenzene moiety so that the new PESU (referred to as poly trimethyl phenylene ethersulfone (TPESU)) has a greater permeability and less aging behavior. The hollow fiber membranes spun from TPESU dopes exhibit excellent gas separation performance with significantly less aging phenomena. Not only do they have superior O_2 and CO_2 permeance of 16 GPU and 85.1 GPU, respectively, but also possess O_2/N_2, CO_2/N_2 and CO_2/CH_4 selectivity of 6.5, 34.0 and 35.5, respectively at 25 ^oC. The pure gases are tested at 3.5 atm except CO_2 at 1 atm. The newly developed TPESU hollow fiber membrane has comparable gas separation performance with those fibers spun from Matrimid. The newly designed TPESU