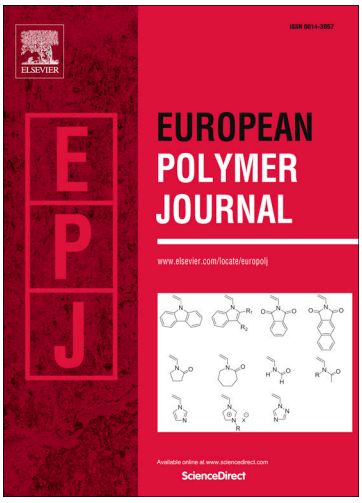

Fabrication of antifouling polypropylene hollow fiber membrane breaking through the selectivity-permeability trade-off

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PII: S0014-3057(18)30920-0
DOI: https://doi.org/10.1016/j.eurpolymj.2018.06.025
Reference: EPJ 8461

To appear in: *European Polymer Journal*

Received Date: 20 May 2018
Revised Date: 4 June 2018
Accepted Date: 27 June 2018

Please cite this article as: Shao, H., Qi, Y., Luo, D., Liang, S., Qin, S., Yu, J., Fabrication of antifouling polypropylene hollow fiber membrane breaking through the selectivity-permeability trade-off, *European Polymer Journal* (2018), doi: https://doi.org/10.1016/j.eurpolymj.2018.06.025

Fabrication of antifouling polypropylene hollow fiber membrane breaking through the selectivity-permeability trade-off

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Abstract: To overcome the permeability-selectivity trade-off in the polymer-based membranes, our key strategy is to construct the microstructures of polypropylene hollow fiber membranes by in situ ultrasonic wave-assisted graft polymerization, and incorporate hydrophilic groups into the inner of membranes. The main objective is to eliminate the drawback resulted from pore sizes decreased in the surface modification through increasing the hydrophilicity of the membrane inner. Functional groups were incorporated on the surface and inner of membranes through altering grafted monomers and the amino acids induced epoxy ring opening reaction. The hydrophilicity of the membrane inner was largely enhanced due to the introduction of zwitterionic copolymers. The as-prepared membrane PPM3 had excellent pure water flux (264 L /m^2 h) and rejections of BSA (99.9%), Cong red (99.9%) as well as methylthionine chloride (99.2%) at the transmembrane pressure of 0.2MPa. This study can provide new insights into breaking through the permeability-selectivity trade-off.

Keywords: Permeability; Selectivity; Trade-off; Ultrasound; Graft polymerization; Polypropylene hollow fiber membrane

1. Introduction

Polypropylene (PP) hollow fiber membrane has been widely used in numerous separation processes for their advantages of excellent mechanical strength, good chemical and thermal stability as well as low cost [1-3]. However, the inherent hydrophobicity of PP membrane makes it easy to be contaminated during filtration,