

## Author's Accepted Manuscript

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PII: S0376-7388(16)30790-6  
DOI: <http://dx.doi.org/10.1016/j.memsci.2016.10.015>  
Reference: MEMSCI14801

To appear in: *Journal of Membrane Science*

Received date: 26 June 2016  
Revised date: 21 September 2016  
Accepted date: 9 October 2016

Cite this article as: João da Silva Burgal, Ludmila Peeva and Andrew Livingston Negligible ageing in poly(ether-ether-ketone) membranes widens application range for solvent processing, *Journal of Membrane Science* <http://dx.doi.org/10.1016/j.memsci.2016.10.015>

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# Negligible ageing in poly(ether-ether-ketone) membranes widens application range for solvent processing

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Keywords: ageing, poly(ether ether ketone), organic solvent nanofiltration, high-temperature operation

## Abstract

Organic solvent nanofiltration membranes have been prepared from poly(ether-ether-ketone) (PEEK) by phase inversion. Remarkably, these membranes undergo negligible ageing, even under extreme conditions of high temperature air annealing, and high temperature solute filtration with aggressive solvents. This negligible ageing of PEEK membranes is contrasted with substantial ageing of crosslinked polybenzimidazole (PBI) and polyimide (PI) membranes. After air annealing at 120 °C, PBI and PI membranes become brittle and lose all permeance, whereas PEEK membranes remain flexible and retain a constant permeance of  $\sim 0.2 \text{ L}\cdot\text{h}^{-1}\cdot\text{m}^2\cdot\text{bar}^{-1}$  for tetrahydrofuran (THF). The structural change in PBI and PI membranes is attributed to polymer transition from a non-equilibrium glassy state towards an equilibrium state at which chain packing precludes permeation of solvent. High temperature filtrations in DMF up to 140 °C for the three polymeric membranes showed PEEK

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