Thermal Oxidative Crosslinking of Phenolphthalein-based Cardo Polyimides with Enhanced Gas Permeability and Selectivity

Caili Zhang, Bing Cao, Pei Li

www.elsevier.com/locate/memsci

PII: S0376-7388(17)31541-7
DOI: https://doi.org/10.1016/j.memsci.2017.10.015
Reference: MEMSCI15642

To appear in: *Journal of Membrane Science*

Received date: 29 May 2017
Revised date: 24 July 2017
Accepted date: 8 October 2017

Cite this article as: Caili Zhang, Bing Cao and Pei Li, Thermal Oxidative Crosslinking of Phenolphthalein-based Cardo Polyimides with Enhanced Gas Permeability and Selectivity, *Journal of Membrane Science,* https://doi.org/10.1016/j.memsci.2017.10.015

Thermal Oxidative Crosslinking of Phenolphthalein-based Cardo Polyimides with Enhanced Gas Permeability and Selectivity

Caili Zhang, Bing Cao, Pei Li*

College of Materials Science and Engineering, Beijing University of Chemical Technology, Beijing, 100029, China.

*Corresponding author. lipei@mail.buct.edu.cn

Abstract

A proper increase of *d*-spacing after crosslinking is an effective strategy to enhance gas separation performance and anti-plasticization property of polymeric membranes. One way to achieve high chain distance is to design and prepare polymer precusors that have large side groups with crosslinkable functionality. Our previous research proved that the decarboxylation crosslinked polyimides connected by a biphenyl group showed enlarged *d*-spacing. However, the 100% crosslinking temperature is 425-450 °C that is higher than the glass transition temperature (T_g) of most polymers and may cause problem for preparing asymmetric crosslink membranes. Here we proposed a thermal oxidative crosslinking method which had a lower crosslinking temperature than the decarboxylation crosslinking method. Specifically, we synthesized two phenolphthalein-based cardo diamines, MPP and PP, with or without CH_3 substituted groups and prepared the 6FDA-MPP and 6FDA-PP polyimides. The lactone ring in the cardo moiety decomposed and the crosslinking reaction took place by heating the polymer in an air purge atmosphere. A 100% conversion of the