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PII: S0376-7388(17)30106-0
DOI: http://dx.doi.org/10.1016/j.memsci.2017.02.030
Reference: MEMSCI15089

To appear in: *Journal of Membrane Science*

Received date: 11 January 2017
Revised date: 4 February 2017

Cite this article as: Caili Zhang, Pei Li and Bing Cao, Effects of the side group of the spirobichroman-based diamines on the chain packing and gas separatio properties of the polyimides, *Journal of Membrane Science* http://dx.doi.org/10.1016/j.memsci.2017.02.030

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Abstract

Three spirobichroman-based diamines, FSBC, SBC and MSBC, with different substituted groups (-CF_3, -H, and -CH_3) were synthesized. The diamines were reacted with 4,4'-hexafluoroisopropylidene bisphthalic dianhydride (6FDA) to form 6FDA-FSBC, 6FDA-SBC, and 6FDA-MSBC polyimides, respectively. The organosolubilities, molecular weights (M_n), densities, glass transition temperature (T_g), thermal stabilities, fractional free volume (FFV), d-spacing and gas separation properties of the spirobichroman-based polyimides were systematically studied. The three spirobichroman-based polyimides had high M_n and T_g, excellent thermal stabilities, and good solubilities in a wide range of organic solvents. 6FDA-FSBC exhibited the highest gas permeability which could be attributed to its insufficient chain packing conditions rooting from the incorporation of spriobichroman backbone