Self-assembly fabrication of ordered microporous films from a soluble polyimide modified by methyl groups based on Breath Figures

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\textbf{ABSTRACT}

A kind of soluble and low-molecular polyimide was obtained from 3,3',4,4'-benzophenonetetracarboxylic dianhydride (BTDA) and 3,3'-dimethyl-4,4'-diaminodiphenylmethane (DMMDA) with N,N-dimethylformamide (DMF) as solvent by a two-step method, and it could be dissolved both in strong polar solvents and in common low-boiling-point solvents. The ordered porous films were prepared by spreading the solution on solid substrate using water droplets as templates, and the pore size was about 1\,\mu m. Furthermore, several influencing factors on the morphologies of the ordered pores, such as the concentration of the solution, solvents, and the solid substrates, were investigated. Fabrication of ordered microporous films from a kind of low-molecular polymer, with the number-average molecular mass (\(M_n\)) of 50433, was reported for the first time in this study. The results showed that the best-ordered pattern with strong periodicity, regularity, and a large, defect-free area could be formed from the polyimide with concentration of 50 mg/mL using dichloromethane as solvent and silicon as substrate.

\textit{Keywords:} Polyimide; Soluble; Ordered micropores; Breath Figures; Self-assembly

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