Supporting information

Synthesis of Highly Gas Permeable Polyimides of Intrinsic Microporosity Derived from 1,3,6,8-Tetramethyl-2,7-diaminotriptycene

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EXPERIMENTAL

Gas Permeation Measurements

The gas permeability values of the polymers were determined at 2 bar upstream pressure and 35 °C using the constant-volume/variable-pressure method. The membranes were degassed in the permeation system on both sides under high vacuum at 35 °C for at least 24 h. The increase in permeate pressure with time was recorded by a MKS Baratron transducer. The gas permeability was determined by:

$$P = D \times S = 10^{10} \times \frac{V_d \times l}{p_{up} \times T \times R \times A} \times \frac{dp}{dt}$$

where P is the permeability (Barrer) – 1 Barrer = 10^{-10} cm^3(STP) cm cm^{-2} s^{-1} $cmHg^{-1}$, p_{up} is the upstream pressure (cmHg), dp/dt is the steady-state permeate-side pressure increase (cmHg s^{-1}), V_d is the calibrated permeate volume (cm^3), l is the membrane thickness (cm), A is the effective membrane area (cm^2), T is the operating temperature (K), and R is the gas constant (0.278 cm^3 cmHg cm^{-3}(STP) K^{-1}).

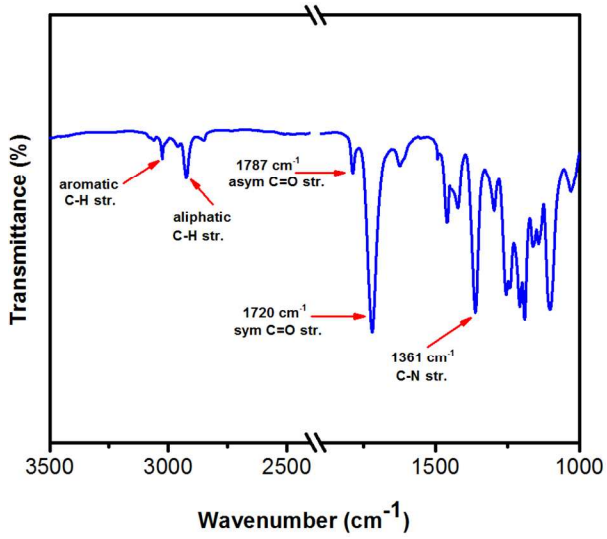

Figure S1. FTIR spectrum of 6FDA-TMDAT polyimide.

Single crystal data description of 1,3,6,8-tetramethyl-2,7-dinitrotriptycene (CCDC 1515556).

Chemical formula	$C_{22}H_{16}N_2O_4$
M_r	372.37.29
space group	P21/n
Temperature (K)	239
a, *b*, *c* (Å)	10.0613(5), 12.4752 (6), 14.7910 (7)
Z	4
Radiation type	Mo *K*α
μ (mm^{-1})	0.782

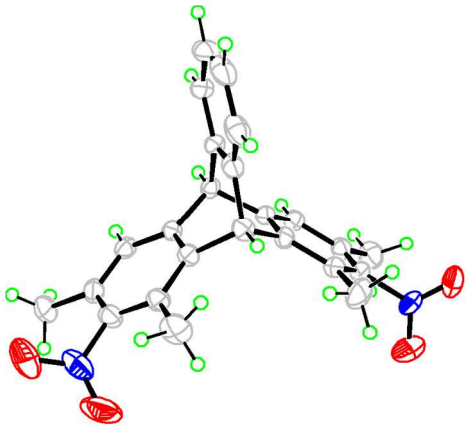

Figure S2. ORTEP of 1,3,6,8-tetramethyl-2,7-dinitrotriptycene.

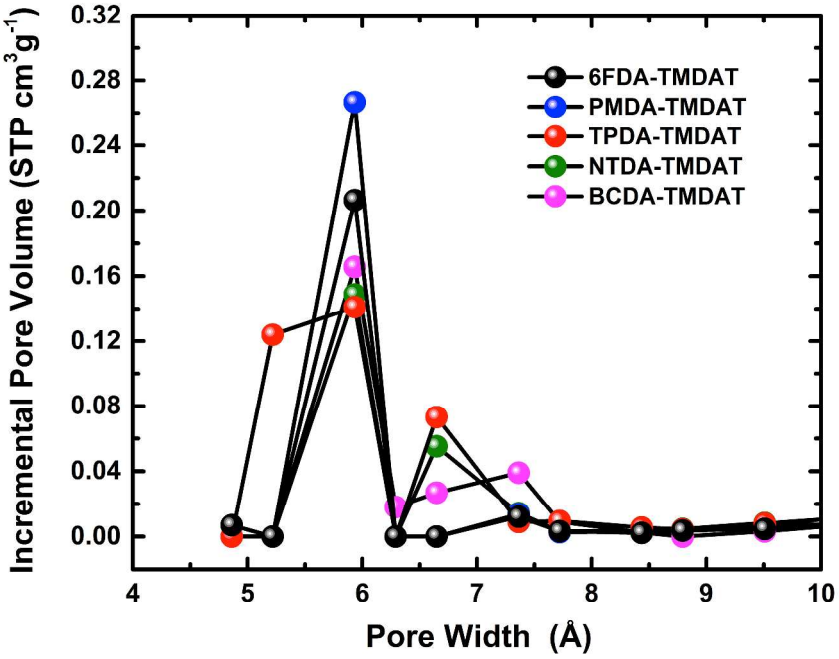

Figure S3. Pore size distribution of TMDAT-based polyimides derived by NLDFT from nitrogen adsorption at 77 K.

Table S1. Solubility of TMDAT-Derived Polyimides in Different Solvents.

Polymer	Acetone	$CHCl_3$	CH_2Cl_2	DMAc	THF	NMP
6FDA-TMDAT	-	+	+	+	+	+
PMDA-TMDAT	-	+	+	+	-	+
TPDA-TMDAT	-	+	+	-	-	+
NTDA-TMDAT	-	+	+	+	-	+
BCDA-TMDAT	-	_	+	+	-	+