Supplementary Information

High-Performance Electrofluorochromic Devices Based on Aromatic Polyamides with AIE-active Tetraphenylethene and Electro-active Triphenylamine Moieties

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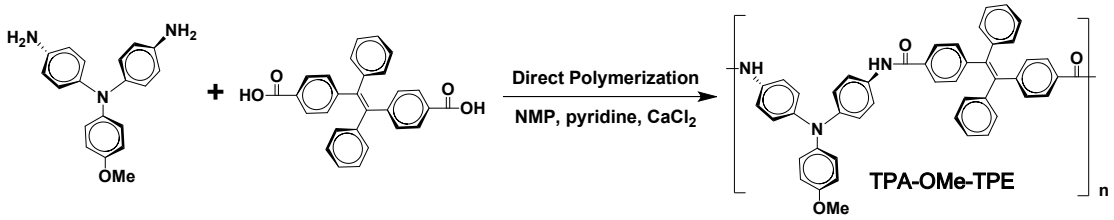
List of Contents for Supplementary Information:

Preparation of polyamide (TPA-OMe-TPE)

A mixture of 0.31 g (1.0 mmol) of 4,4′-diamino-4″-methoxytriphenylamine, 0.42 g (1.0 mmol) of 4,4′-(1,2-diphenylethene-1,2-diyl)dibenzoic acid, 0.13 g of calcium chloride, 1.0 mL of triphenyl phosphite (TPP), 0.3 mL of pyridine, and 1.0 mL of NMP was heated with stirring at 105 °C for 3 h. The polymer solution was then poured slowly into 300 mL of stirring methanol. The resulting stringy and fiber-like precipitates were collected by filtration, washed thoroughly with hot water and methanol successively, and dried under vacuum at 100 °C. Reprecipitation was carried out twice by pouring the DMAc solution of the polymer product into stirring methanol for further purification. The inherent viscosity, weight-average molecular weights (M_w), and polydispersity index (PDI) of the obtained polyamide **TPA-OMe-TPE** were 0.31 dL/g (measured at a concentration of 0.5 g/dL in DMAc at 30 ℃), 19,000 daltons, and 1.96, respectively. The FT-IR spectrum of **TPA-OMe-TPE** (film) exhibited characteristic amide absorption bands at 3320 cm^{-1} (N-H stretching) and 1500 cm^{-1} (N-H bending), 1657 cm^{-1} (amide carbonyl), 2920 cm^{-1} (C-H stretching), and 1240 cm^{-1} (C-N stretching). ^{1}H NMR (400 MHz, DMSO-d_6, δ, ppm): 10.13-10.06 (s, 2H), 7.81-7.69 (d, 4H), 7.66-7.56 (d, 4H), 7.23-7.07 (m, 10H), 7.07-6.92 (d, 4H), 6.90-6.82 (m, 8H), 3.77-3.67 (s, 3H).



Scheme S1. Synthetic scheme of polyamide **TPA-OMe-TPE**.

Table S1. Thermal Properties of **TPA-OMe-TPE**[a]

Polymer[a]	T_g[b] (°C)	T_d at 5 % weight loss (°C)[c]		T_d at 10 % weight loss (°C)[c]		Char yield (%)[d]
		N_2	Air	N_2	Air	
TPA-OMe-TPE	230	455	430	505	475	67

[a] The polymer film samples were heated at 250 °C for 1 h prior to all the thermal analyses.

[b] Midpoint temperature of baseline shift on the second DSC heating trace (rate: 20 °C /min) of the sample after quenching from 400 °C to 50 °C (rate: 200 °C /min) under nitrogen.

[c] Temperature at which 5 % and 10% weight loss occurred, respectively, recorded by TGA at a heating rate of 20 °C/min and a gas flow rate of 20 cm^3/min.

[d] Residual weight percentages at 800 °C under nitrogen flow.

Table S2. Inherent Viscosity and Molecular Weight of **TPA-OMe-TPE**

Polymer	η_{inh}[a] (dL/g)	M_w[b]	M_n[b]	PDI[c]
TPA-OMe-TPE	0.31	19000	9700	1.96

[a] Measured at a polymer concentration of 0.5 g/dL in DMAc at 30 °C.

[b] Calibrated with polystyrene standards, using NMP as the eluent at a constant flow rate of 0.5 mL/min at 40 °C.

[c] Polydispersity Index (M_w/M_n).

Table S3. Solubility Behavior of **TPA-OMe-TPE**

	Solubility in various solvent[a]						
Polymer	NMP	DMAc	DMF	THF	$CHCl_3$	DMSO	*m*-cresol
TPA-OMe-TPE	++	++	+	++	++	++	+

[a] Qualitative solubility was tested with 10 mg of a sample in 1 mL of solvent. ++, soluble at room temperature; +, soluble on heating; -, insoluble even on heating.

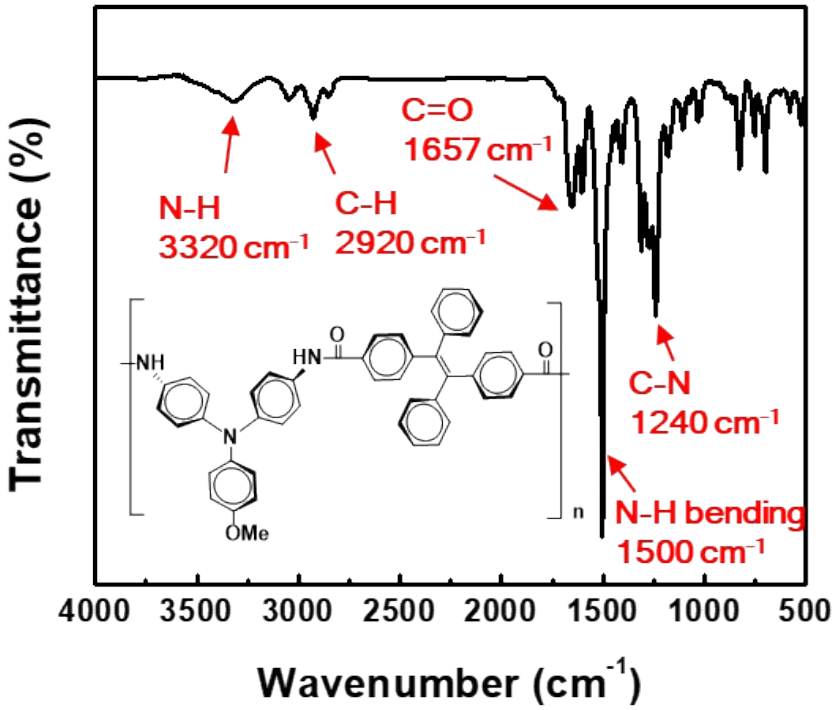


Figure S1 IR spectrum of **TPA-OMe-TPE**.

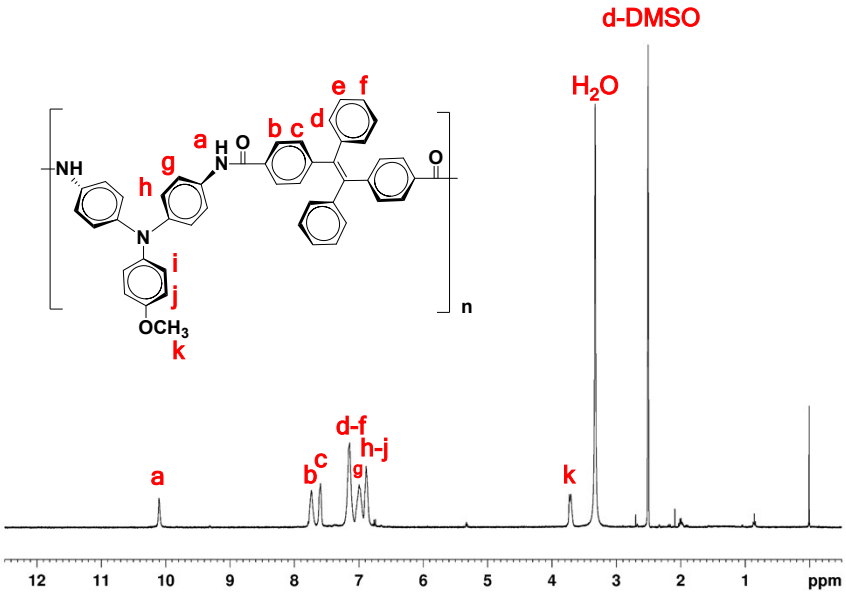


Figure S2 ^{1}H NMR spectrum of **TPA-OMe-TPE.**

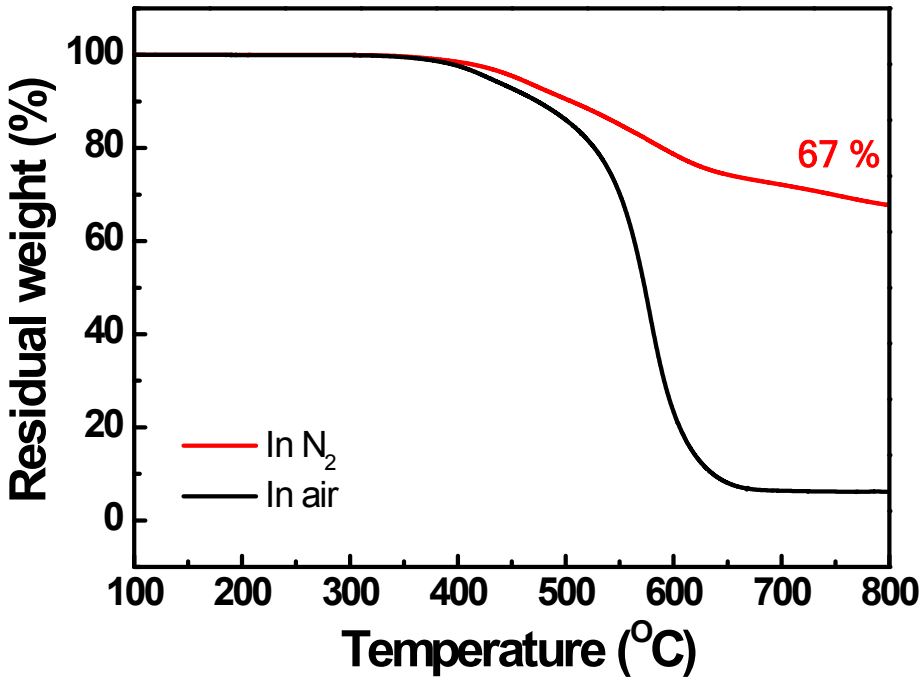


Figure S3 TGA traces of **TPA-OMe-TPE** in N_2 and in air.

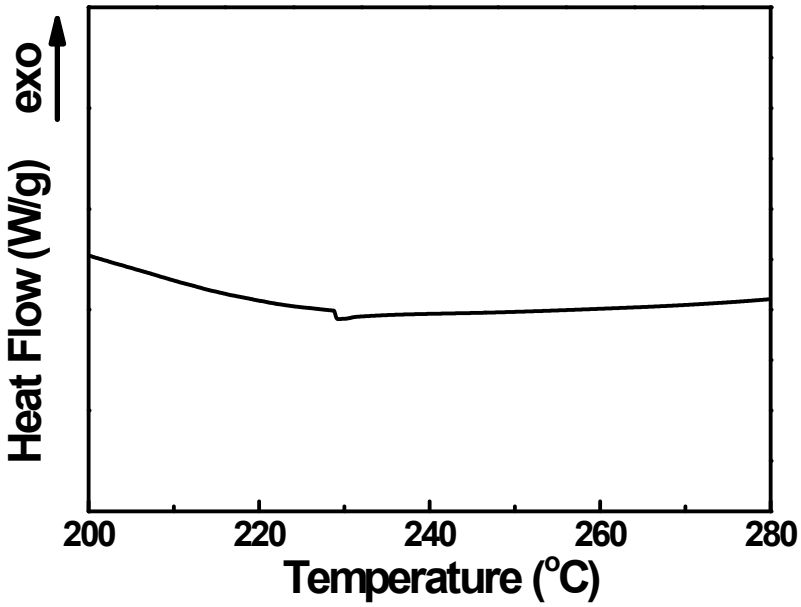


Figure S4 DSC trace of **TPA-OMe-TPE**.

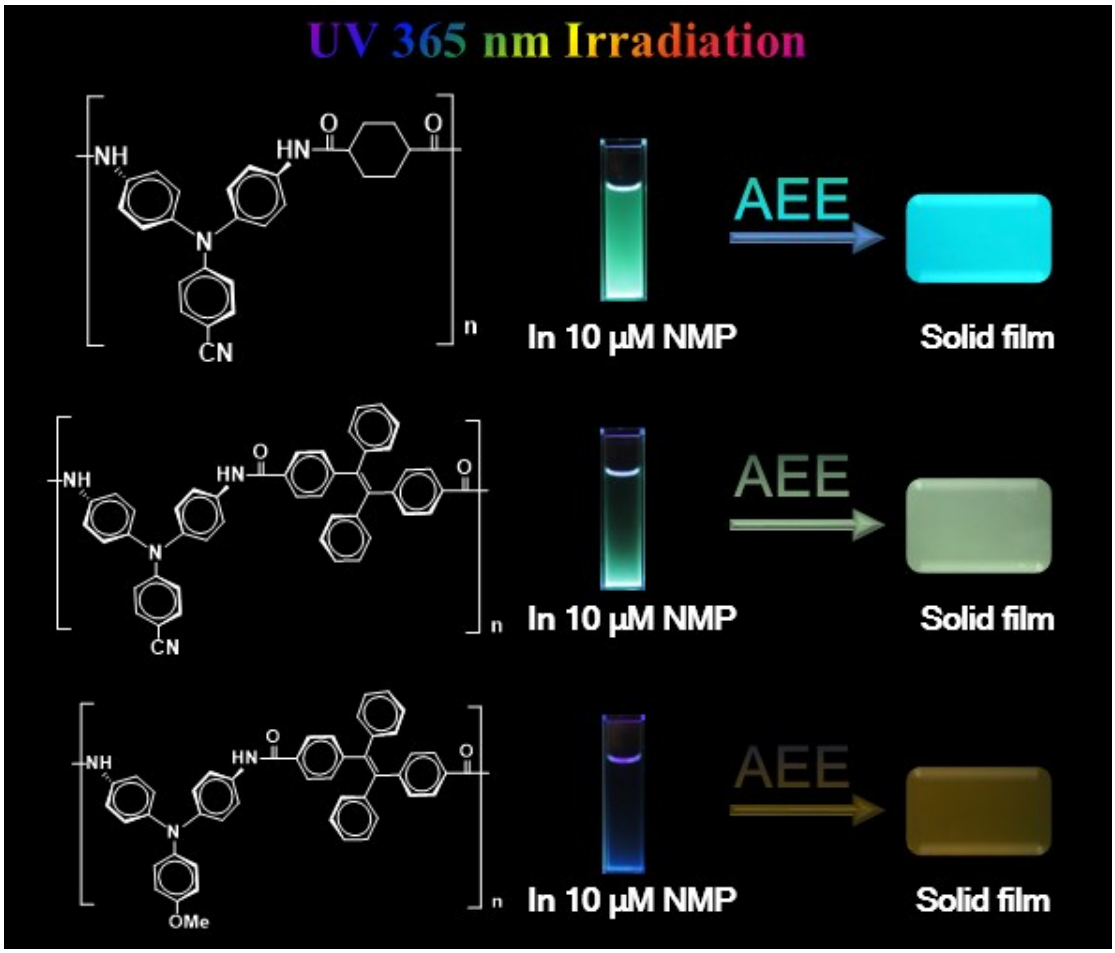


Figure S5 Photographs of the NMP solutions and solid films of the prepared polyamides taken under illumination of 365 nm UV light.