Supplementary Information

Novel Twisted-Structure Polymer Electrode Material with Intrinsic Pores for High-Performance Electrochromic Supercapacitor

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Calculation Formulas.

1. Optical contrast

$$\Delta T = |T_{ox} - T_{neut}| \quad \text{(S1)}$$

T_{ox} and T_{neut} represent the transmittance of the material in the oxidation state and in the neutral state, respectively.

2. Coloration efficiency (CE)

$$CE(\lambda) = \Delta A/Q_d = \log[T_{ox}/T_{neut}]/Q_d \quad \text{(S2)}$$

where ΔA denotes the change in absorbance per unit area, which is expressed by the logarithm of the ratio of the oxidized state transmittance (T_{ox}) and the neutral state transmittance (T_{neut}), and Q_d denotes the charge injected per unit area of the electrode, which can be obtained by integrating the timing current curve.

3. Area-specific capacitance

$$C_s = I \times t / \Delta V \times s \quad \text{(S3)}$$

where I/s is the current density in mA/cm^2, t is the discharge time of the material in s, and ΔV is the voltage window in V.

4. Volume ratio capacitance

$$C_v = I \times t / \Delta V \times v \quad \text{(S4)}$$

where v (cm^3) represents the volume of the electrode material.

5. Coulombic efficiency (CE')

$$CE' = C_d/C_c \times 100\% \quad \text{(S5)}$$

C_d and C_c refer to the discharge capacitance and charge capacitance respectively.

6. Energy density

$$E = CU^2/2 \quad \text{(S6)}$$

C and U refer to the specific capacitance and potential window of the supercapacitor, respectively.

7. Power density

$$P = E/t \quad \text{(S7)}$$

E and t refer to energy density and discharging time of the supercapacitor, respectively.

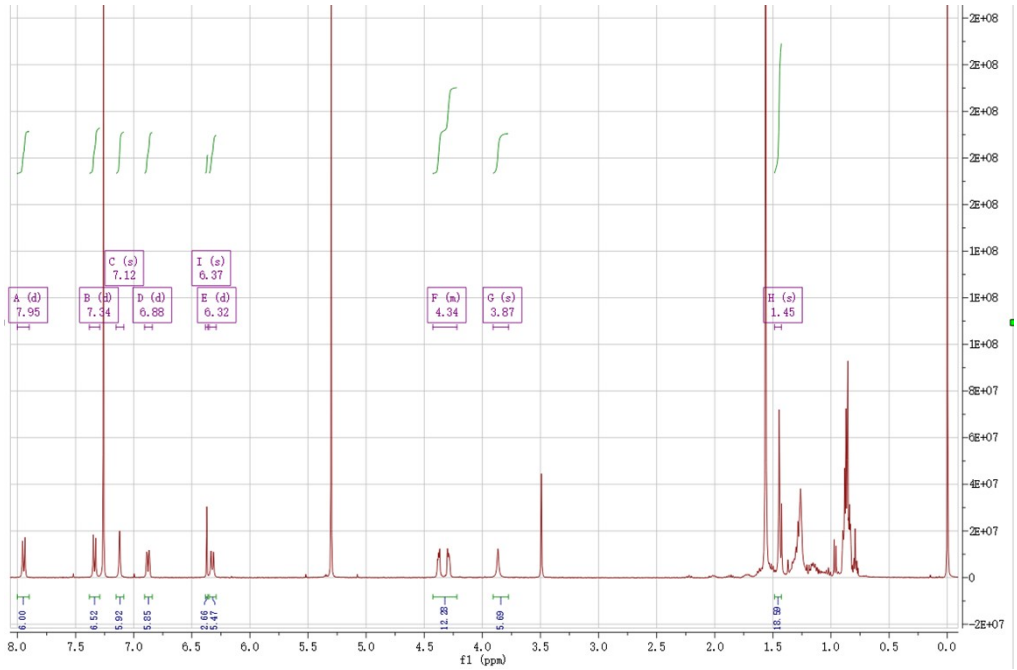

Fig. S1 ^{1}H NMR spectrum of 3DMAC-EDOT in $CDCl_3$.

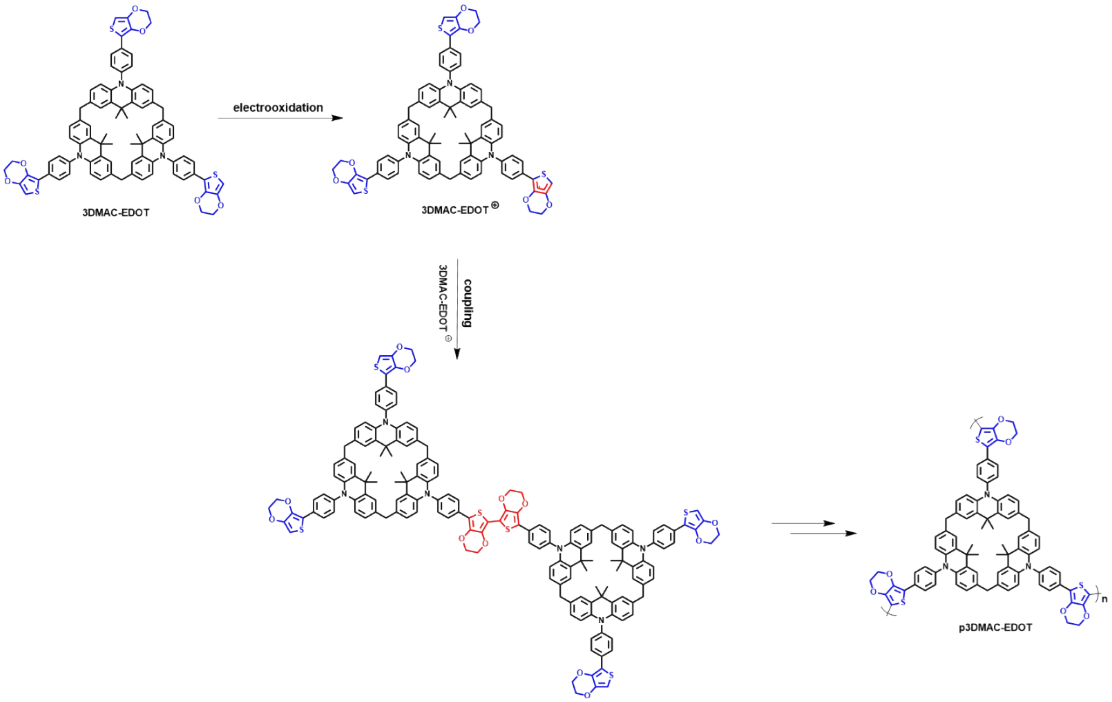

Fig. S2 p3DMAC-EDOT specific polymerization mechanisms

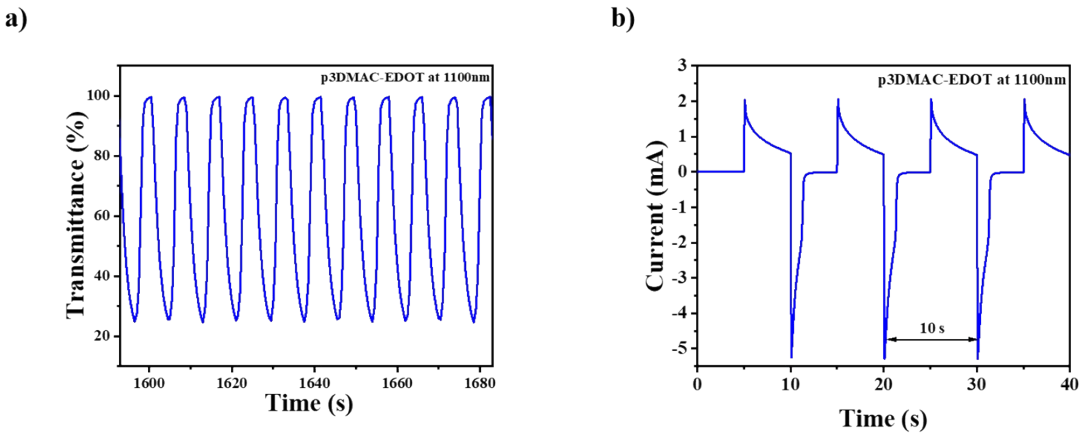

Fig. S3 Transmittance a) and current b) dynamics of p3DMAC-EDOT at 5 s pulse time.

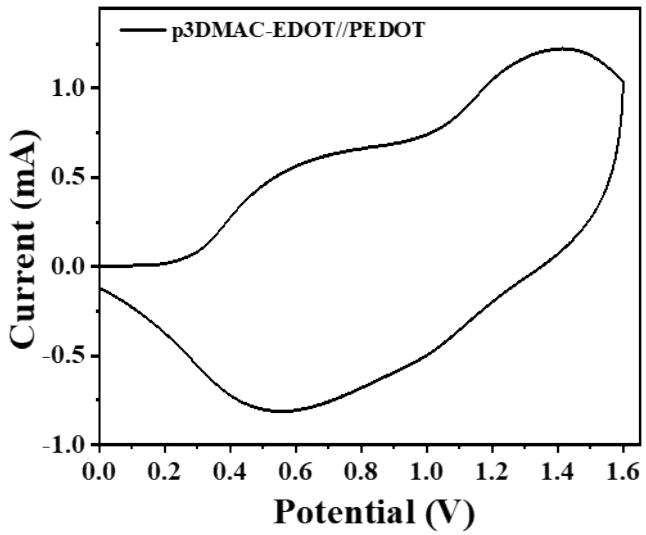

Fig. S4 CV curves for p3DMAC-EDOT//PEDOT devices with a sweep rate of 100 mV/s.

Fig. S5 Exterior color photos of p3DMAC-EDOT//PEDOT devices at different voltages.

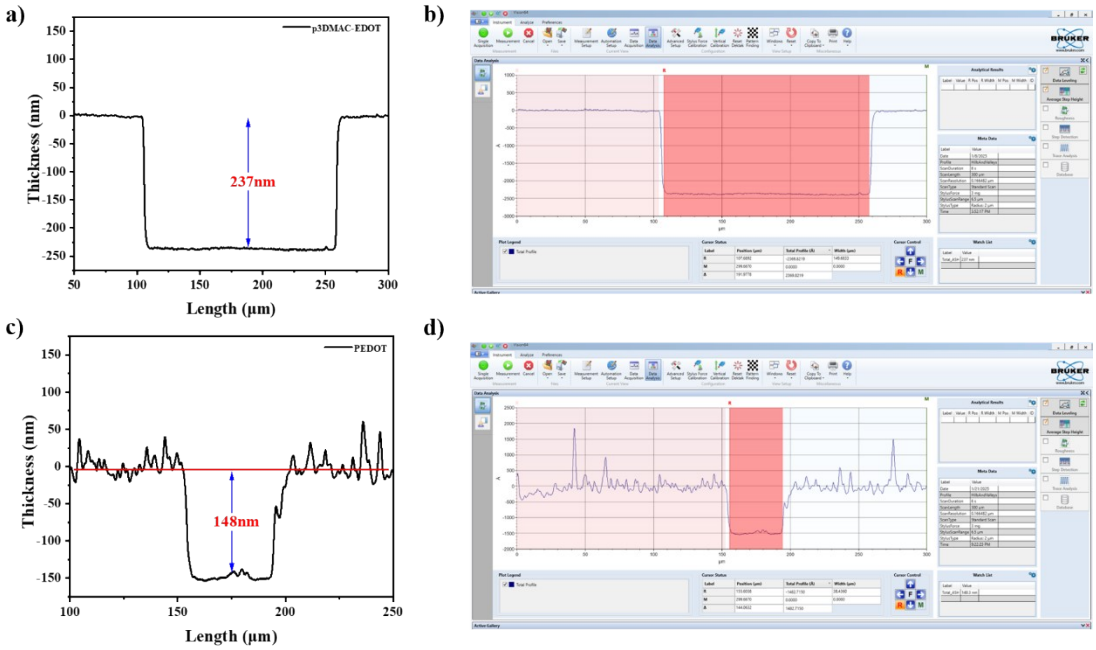

Fig. S6 Thickness of a) and b). p3DMAC-EDOT film, c) and d). PEDOT film.