Supplementary Information (SI) for Journal of Materials Chemistry C.

Electronic Supplementary Information

for

A bifunctional porous organic polymer for NIR-selective electrochromism and bright-to-quenched electrofluorochromic smart windows

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Table S1: Solubility behavior of TPA-TZTZ in different solvents.

Solvent	Solubility (mg/mL)	Remark
DMSO	~0.6	Soluble (limited)
Dimethylacetamide (DMA)	~0.9	Soluble (limited)
Dimethylformamide (DMF)	~0.5	Soluble (limited)
Isopropanol (IPA)	0.1	Very slightly soluble
Methanol	~0.1	Very slightly soluble
THF	0.3	Slightly soluble
Acetonitrile	-	Insoluble

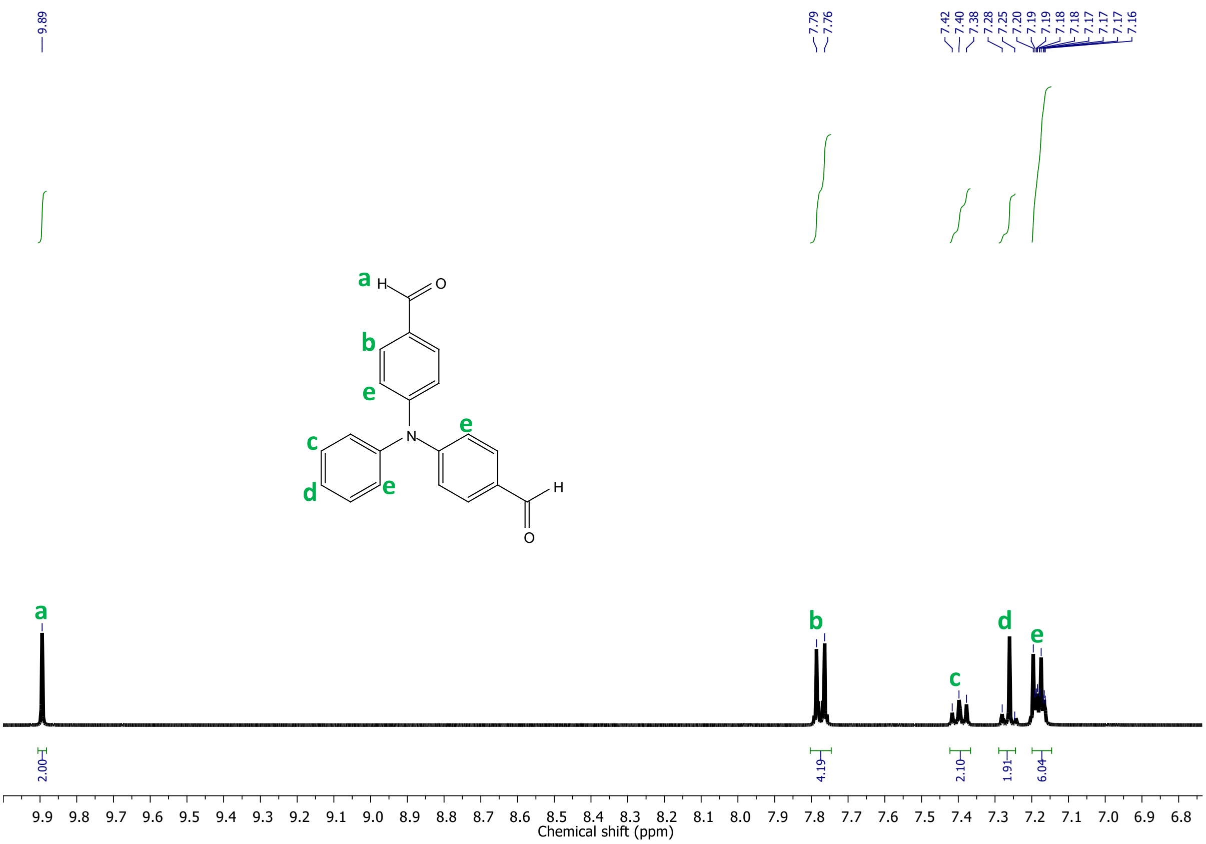

Fig. S1. 1H NMR spectra of 4,4′-Diformyl triphenylamine (c).

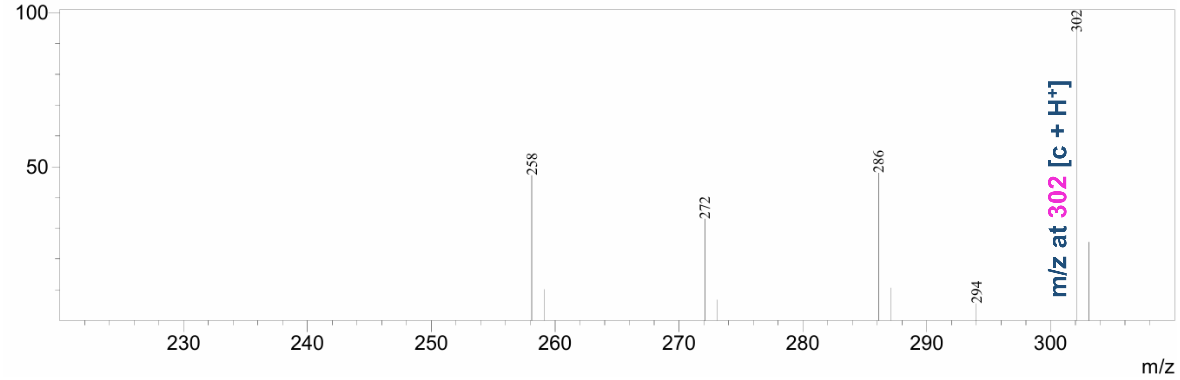

Fig. S2. ESI-Mass spectra of 4,4′-Diformyl triphenylamine (c).

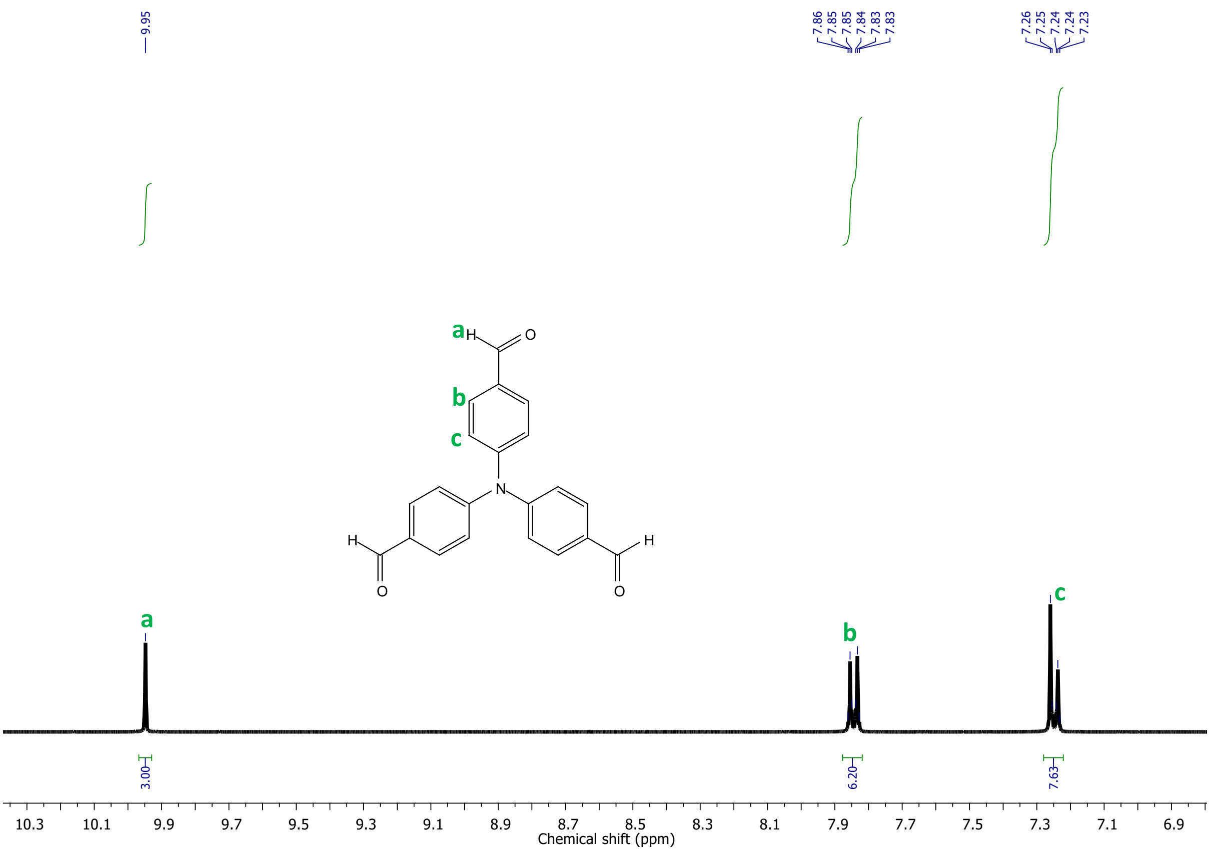

Fig. S3. [1]H NMR spectra of tris-(4-formyl-phenyl)amine.

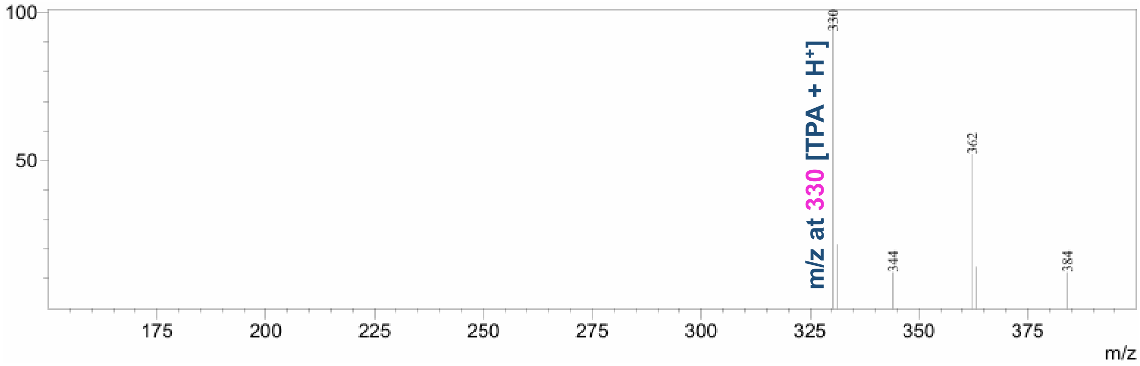

Fig. S4. ESI-Mass spectra of tris-(4-formyl-phenyl)amine.

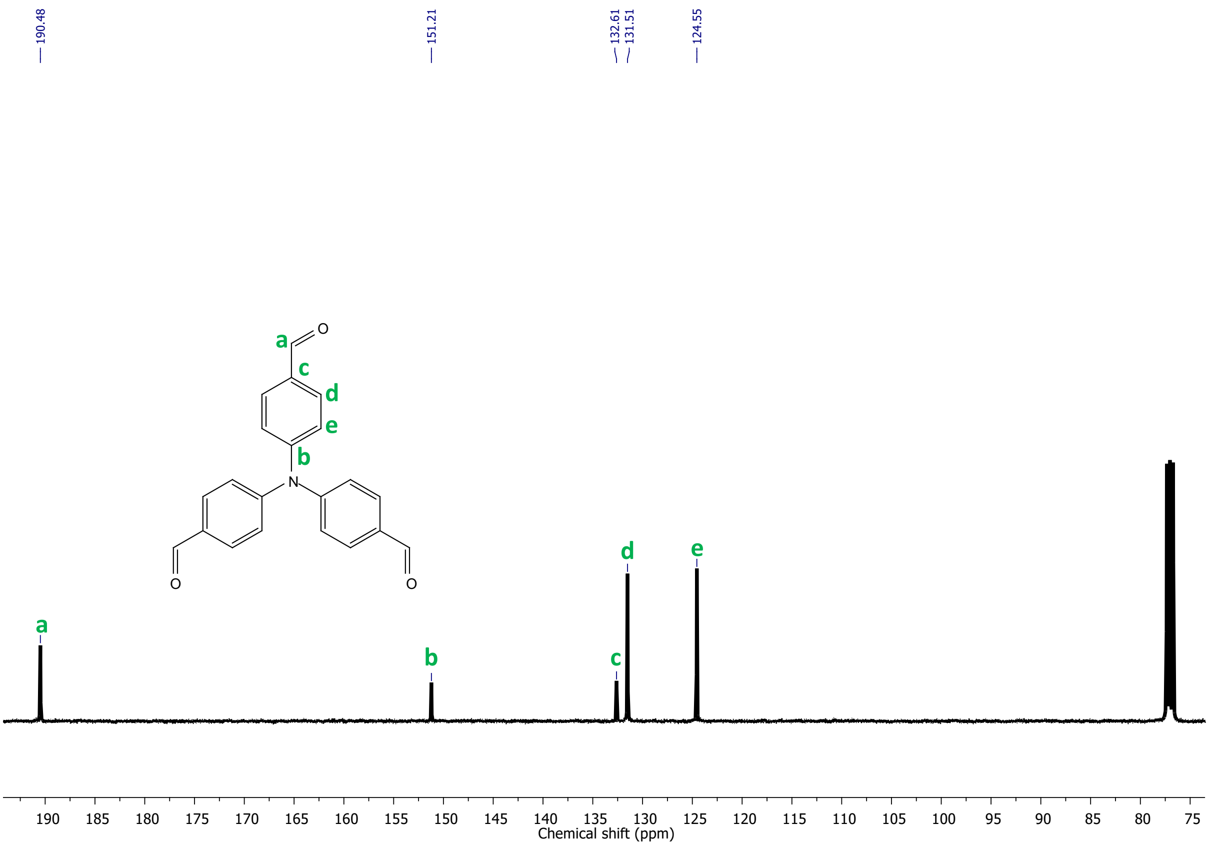

Fig. S5. ^{13}C NMR spectra of tris-(4-formyl-phenyl)amine.

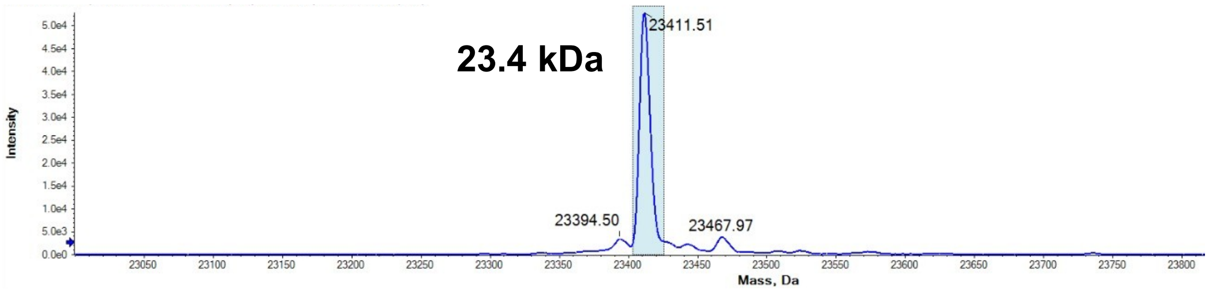

Fig. S6. The MALDI-MS of TPA-TZTZ POP.

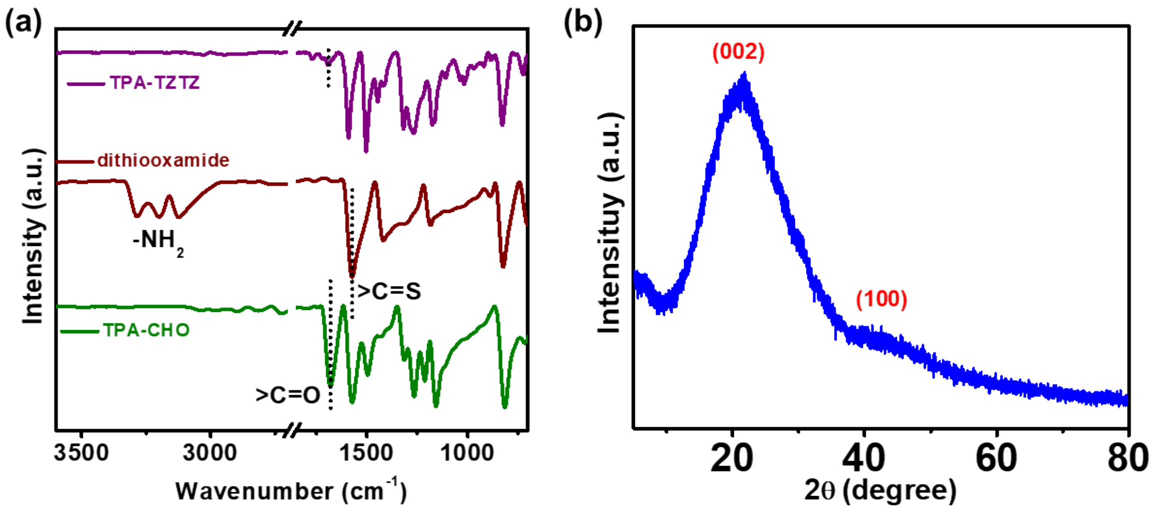

Fig. S7. (a) The FTIR spectra of TPA-TZTZ POP are compared with TPA-CHO and dithiooxamide. (d) Powder X-ray diffraction data of TPA-TZTZ POP.

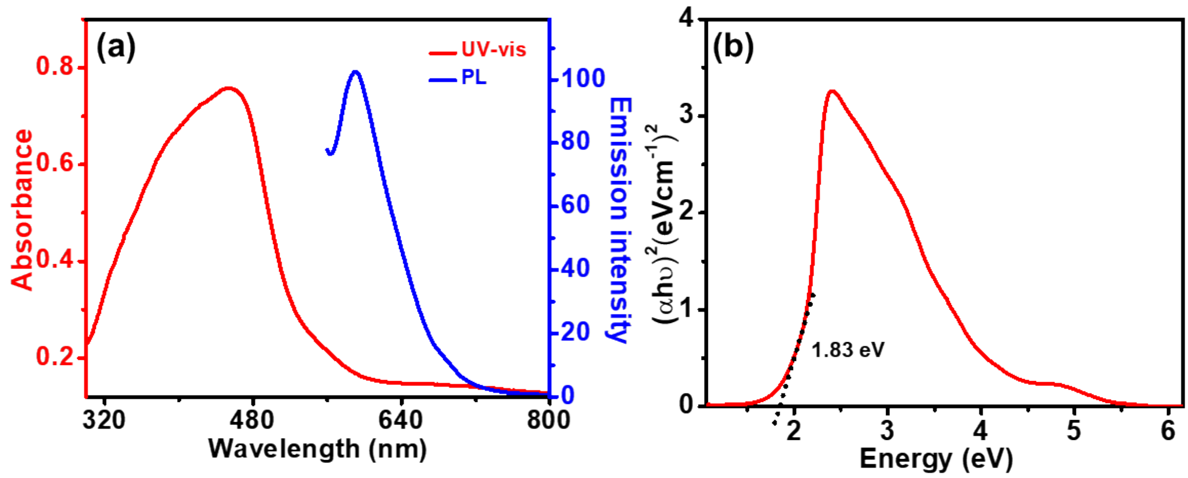

Fig. S8. (a) The UV-vis spectra and emission spectra of the TPA-TZTZ. (b) Tauc plot of TPA-TZTZ POP.

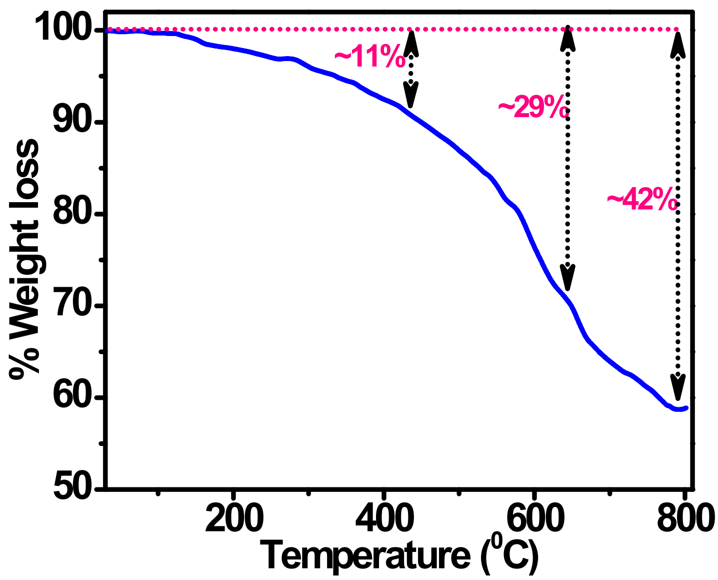

Fig. S9. TGA analysis of TPA-TZTZ POP.

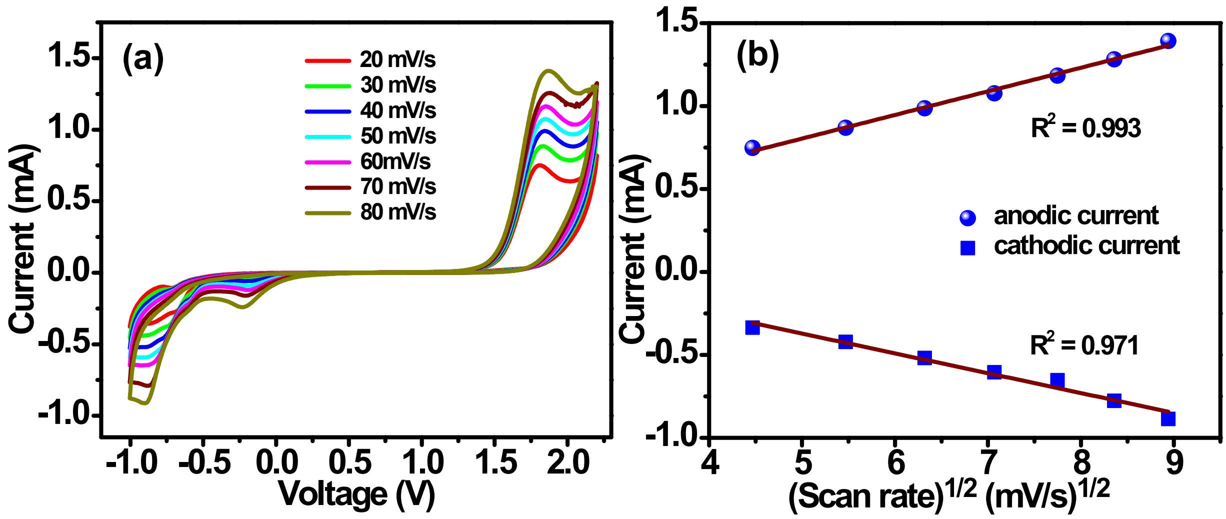

Fig. S10. (a) The scan rate-dependent CV study of TPA-TZTZ-based ECD. (b) Plot of cathodic and anodic peak currents versus the square root of scan rates.

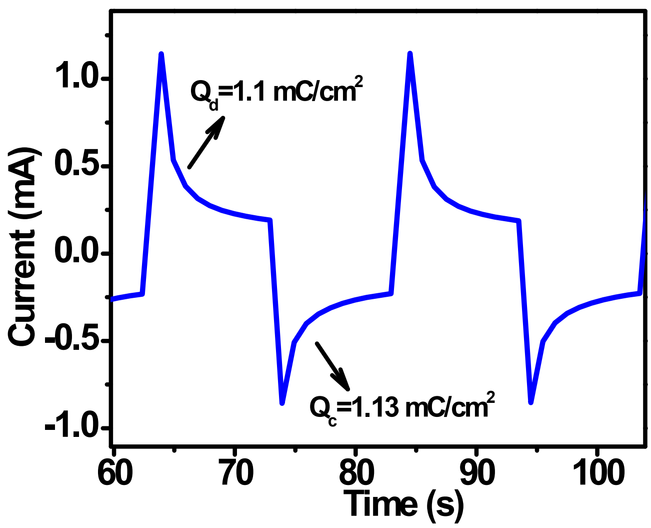

Fig. S11. Chronoamperometric charge-discharge plot of TPA-TZTZ-based ECD.

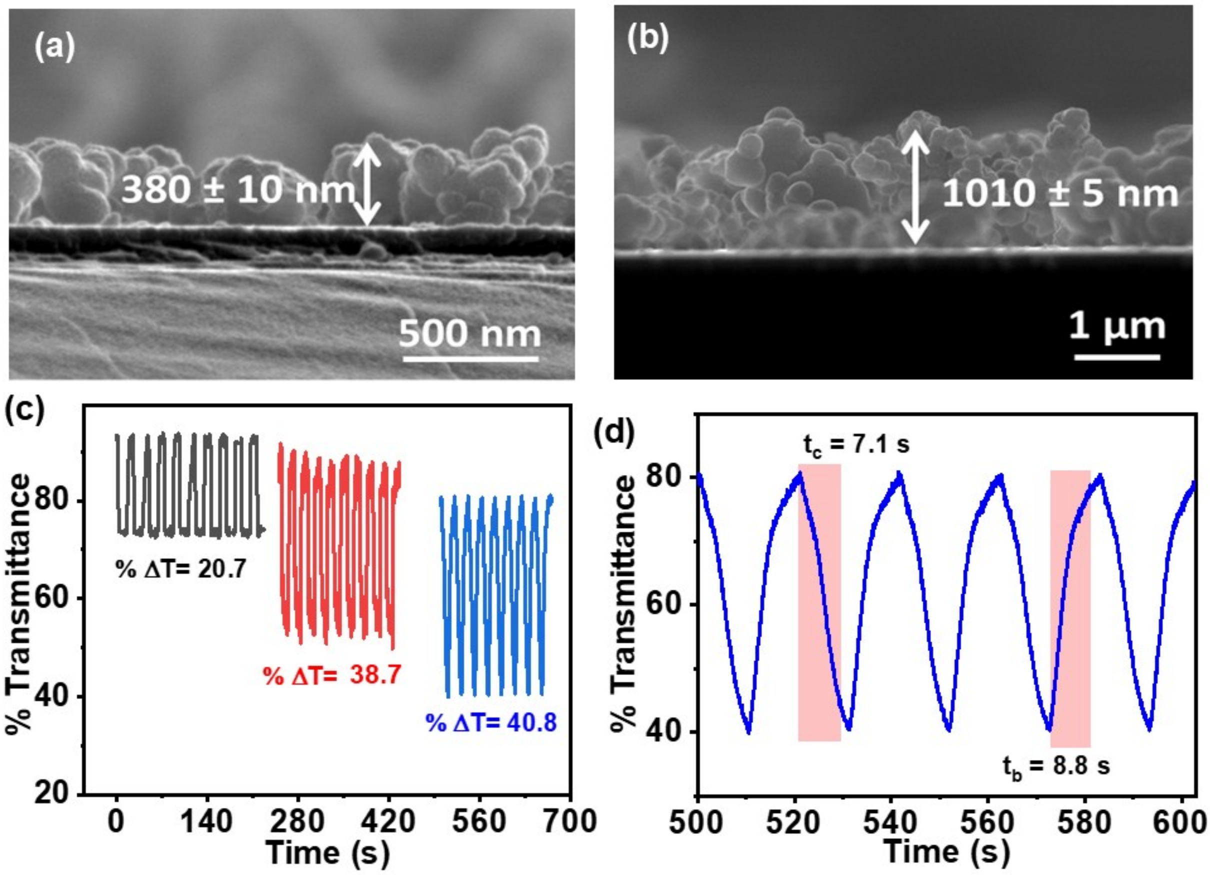

Fig. S12. (a) and (b) The cross-sectional FESEM images of the TPA-TZTZ varying the thickness of the EC films. (c) The combined transmittance changes at 950 nm of the TPA-TZTZ EC films with varying thicknesses of 380 ± 10 nm (black line), 600 ± 10 nm (red line), and 1010 ± 5 nm (blue line). (d) The EC response times for the 1010 ± 5 nm thick film.

Table S2: Comparison of EC performance of TPA-TZTZ with previously reported porous materials.

EC Material	Response times(s) [t_c/t_b]	Optical contrast ΔT (%)	CE (cm^2/C)	EC color change	Cyclic stability	Year	Ref.
TPDA-PDA	1.3/0.7	52 % at 1050 nm	320 at 1050 nm	Plum to grey to light blue	20	2021	1
TATF-COF	4.5/4.9	30 % at 530 nm	115 at 530 nm	Bright yellow to brown	10	2020	2
TPA-TCIF	4.3/9.6	37% at 515 nm	47.7 at 515 nm	Yellow to red	40	2024	3
EC-COF	4.9/10.6	60 % at 1100 nm	144 at 1100 nm	Reddish-orange to olive-green	10	2024	4
Py-ttTII	0.29/0.14	-	620 at 660 nm	Dark green to black	100	2021	5
TAPA-PDA COF	7.9/8.2	18.6 at 465 nm	419 at 465 nm	Four State color	200	2024	6
	8.3/8.6	19.7 at 785 nm	602 at 785 nm				
EC-COF-1	1.8/7.2	33 % at 574 nm	284 at 574 nm	Dark to transmissive	15	2020	7
COF-GZU1 film	2.3/13.4	30.82 at 575 nm	127.8 at 575 nm	bright orange-red to peach and rose	-	2024	8
	7.8/14.5	35.8 at 799 nm	112.8 at 799 nm	Rose to purplish	-		

TAPA-TFPB COF	18.6/0.7	50.2 % at 532 nm	297.4 at 532 nm	yellow to deep red	50	2024	9
COF3PA-TT	18/13	41 %	152	deep red to dark brown	15	2019	10
TPA-TZTZ POP	7.7/3.1	38.7 % at 950 nm	214.2 at 950 nm	yellow to a natural dark shade	200	2026	This Work

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