Supporting Information

Electrochemical copolymerization of 3,4-ethylenedioxythiophene and dithienothiophene: influence of feed ratio on electrical, optical and electrochromic properties

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Table S1. Molar feed ratio of EDOT and DTT used to prepare different copolymers.

Copolymers P[EDOT-*co*-DTT]	**Monomers feed ratio in the copolymerization mixture**	
	EDOT	**DTT**
P1(2:1)	2	1
P2(1:1)	1	1
P3(1:2)	1	2

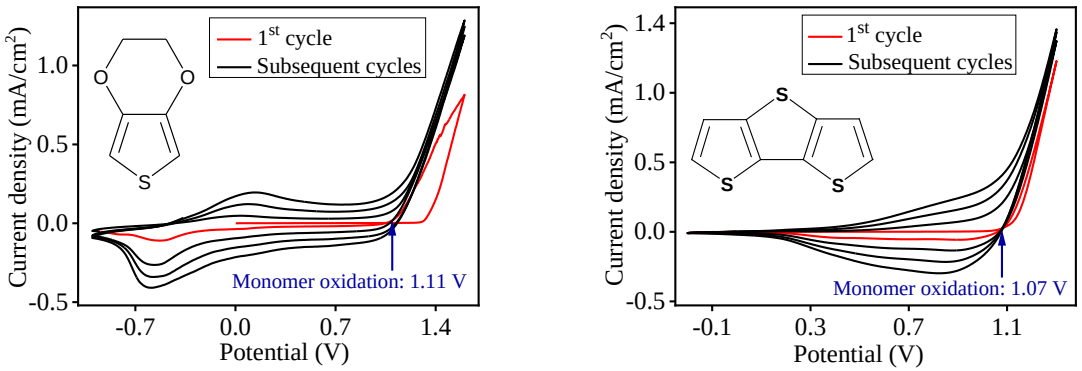


Figure S1. Electrocopolymerization curves of EDOT and DTT in 0.1 M $TBAClO_4$/MeCN solution to electrodeposit homopolymers PEDOT and PDTT at scan rate of 100 mV/s (*vs* Ag/Ag^+ wire, Fc/Fc^+ = 0.40 V).

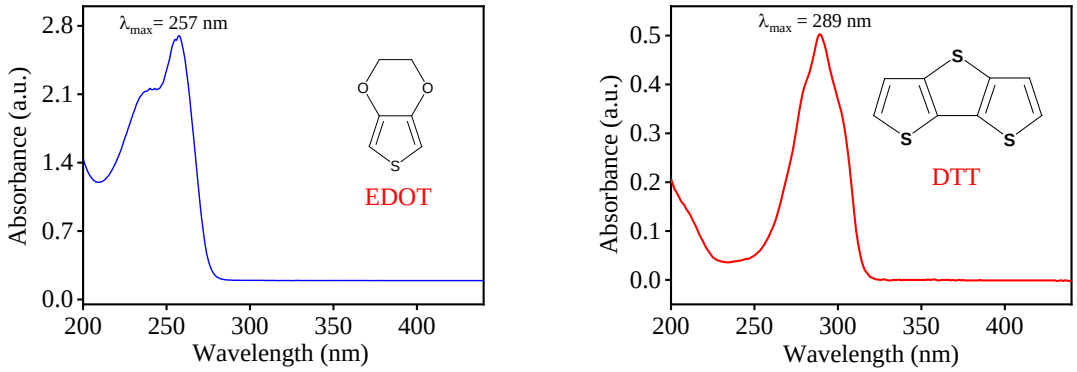
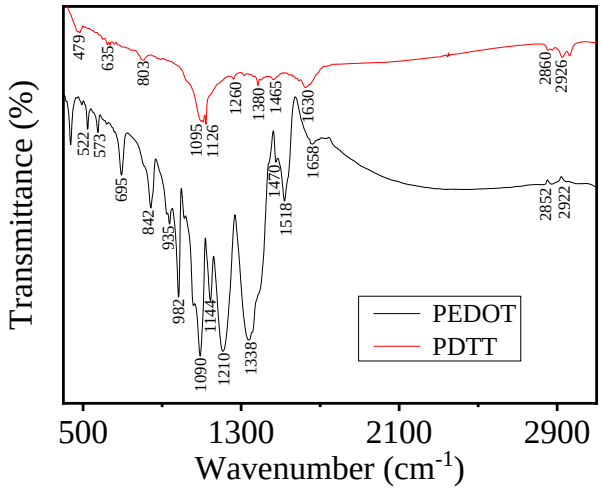


Figure S2. UV-visible absorption spectra of EDOT and DTT in acetonitrile solution.



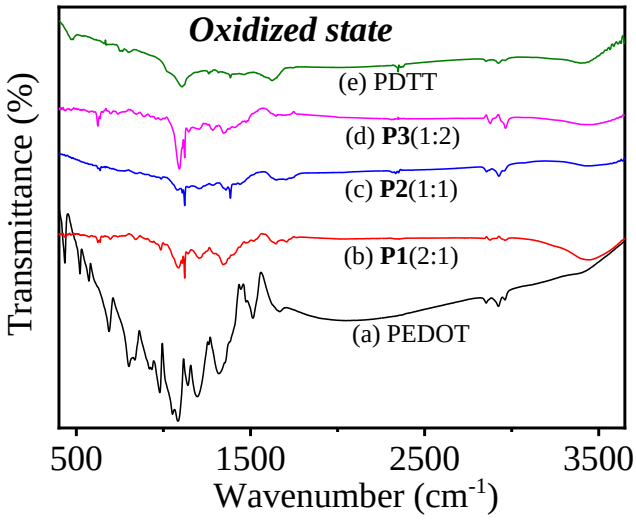
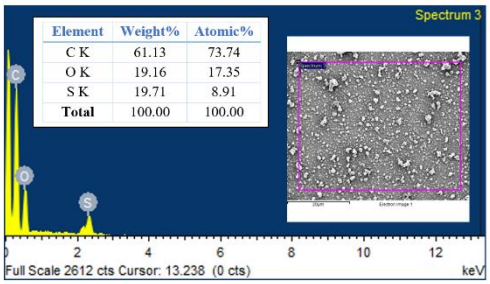
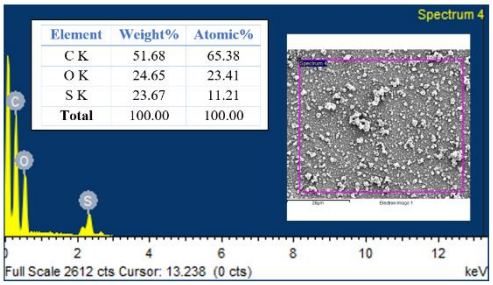
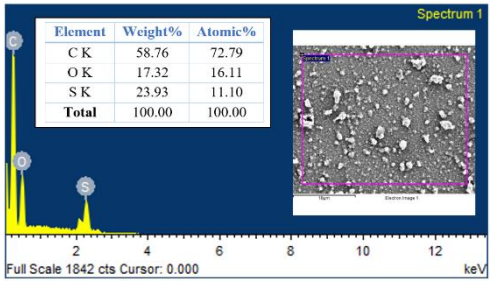
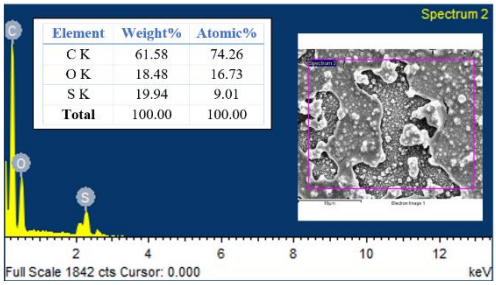
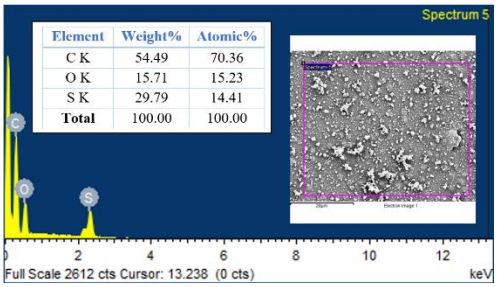
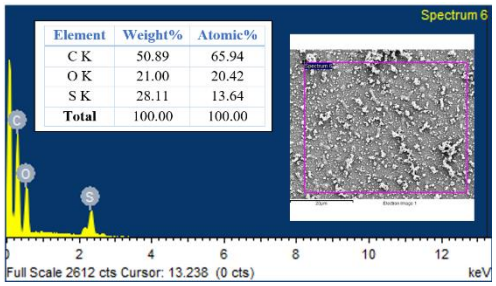


Figure S3. (i) FTIR spectra of PEDOT and PDTT. (ii) FTIR spectra of (a) PEDOT, (b) **P1**(2:1), (c) **P2**(1:1), (d) **P3**(1:2) and (e) PDTT in the oxidized form.

Table S2. Elemental analysis results: EDX spectrum and quantitative analysis of elemental composition of P[EDOT-*co*-DTT] copolymers obtained from various feed ratios of EDOT and DTT.

Copolymer	Neutral state	Oxidized state
P1(2:1)		
P2(1:1)		

P3(1:2)		

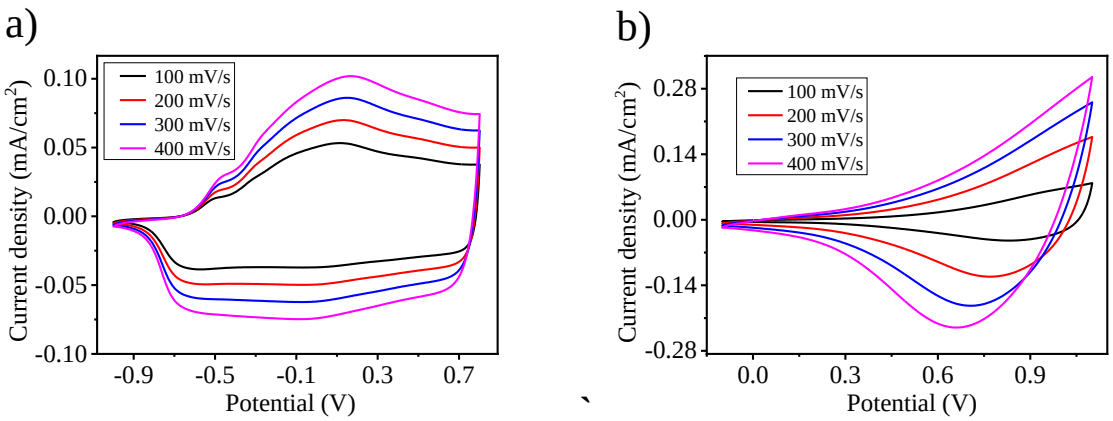
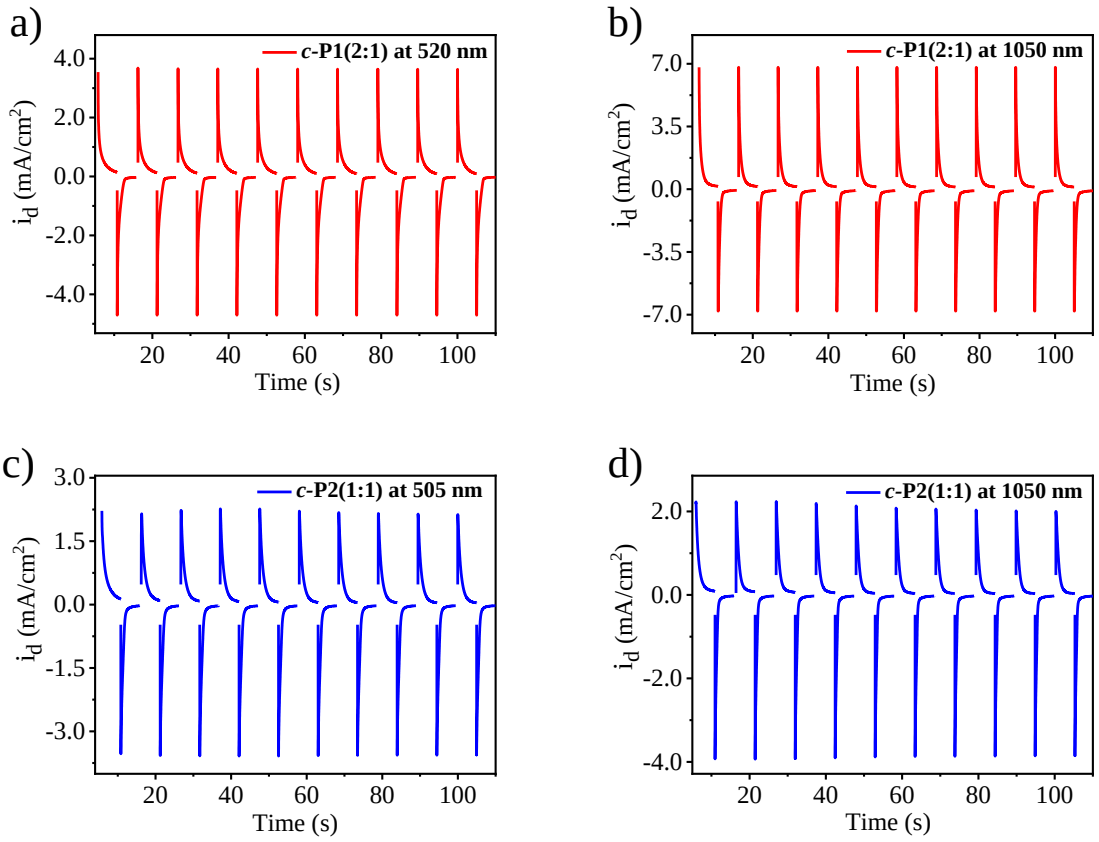


Figure S4. CV curves of PEDOT and PDTT on Pt working electrode in monomer-free electrolytic solution (0.1 M $TBAClO_4$/MeCN) at potential scan rate of 100, 200, 300 and 400 mV/s (*vs* Ag/Ag^+).

Table S3. Photographs of copolymers electrodeposited onto ITO electrode in various feed ratio of EDOT and DTT as 2:1, 1:1 and 1:2. Neutral form denotes the undoped form of the copolymers while oxidized form shows the doped condition.

Copolymers	**Colour of copolymers**	
	Neutral	**Oxidized**
P1(2:1)		

P2(1:1)	
P3(1:2)	


a)
c-P1(2:1) at 520 nm
i_d (mA/cm^2)
Time (s)
b)
c-P1(2:1) at 1050 nm
i_d (mA/cm^2)
Time (s)
c)
c-P2(1:1) at 505 nm
i_d (mA/cm^2)
Time (s)
d)
c-P2(1:1) at 1050 nm
i_d (mA/cm^2)
Time (s)

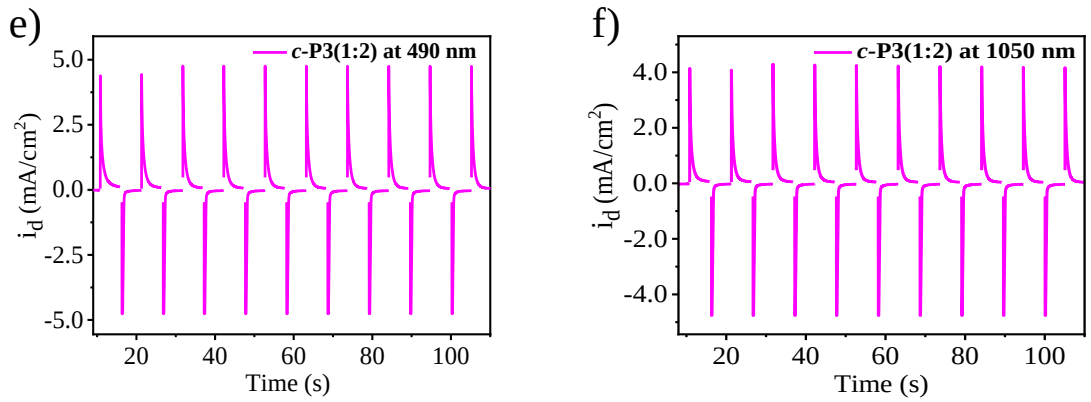


Figure S5. Chronoamperograms showing current consumption during the electrochromic switching of P[EDOT-*co*-DTT] in 0.1 M MeCN/TBAClO$_4$ electrolyte solution at different wavelengths with the switching time of 5 s.

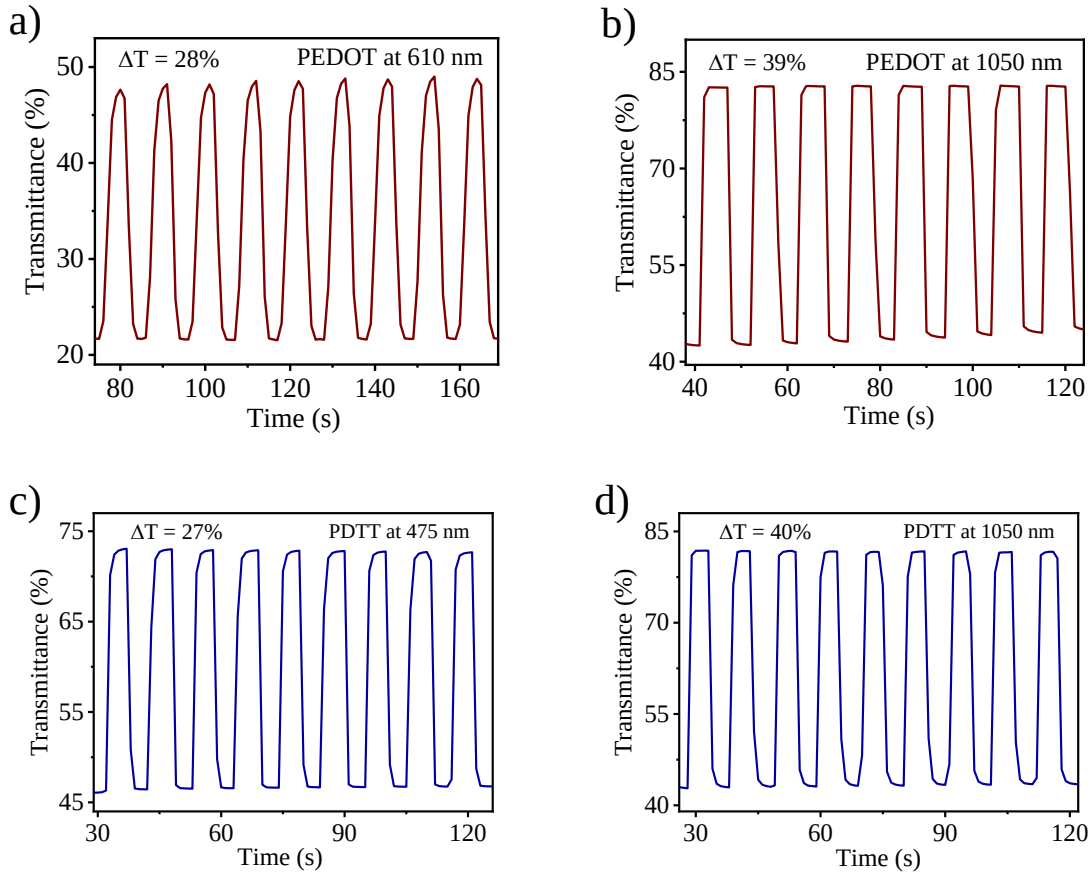


Figure S6. Optical response of the homopolymers a-b) PEDOT and c-d) PDTT in the potential between -1.0 and 1.0 V at λ_{max} and 1050 nm at the switching time of 5 s.