

Supporting Information

Synthesis and Characterization of Novel D-A Type Neutral Blue Electrochromic Polymers Containing Pyrrole[3-c]Pyrrole-1,4-Diketone as the Acceptor Units and the Aromatics Donor Units with Different Planar Structures

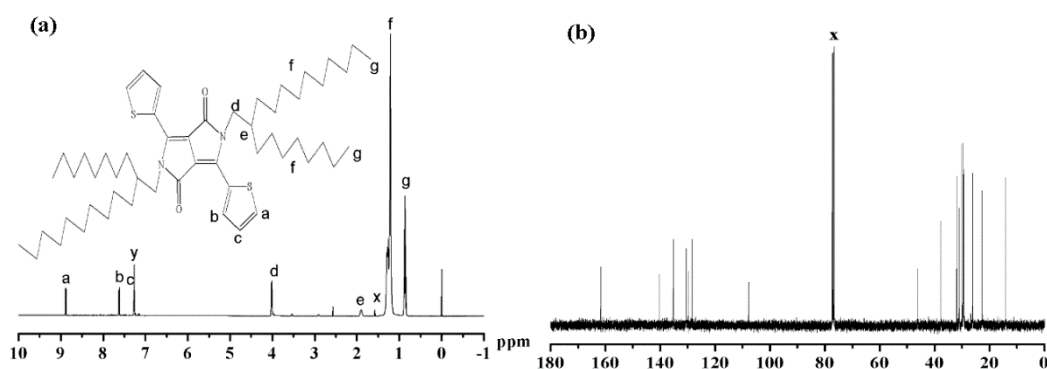


Figure S1. <sup>1</sup>H NMR (a) and <sup>13</sup>C NMR (b) spectra of compound B.

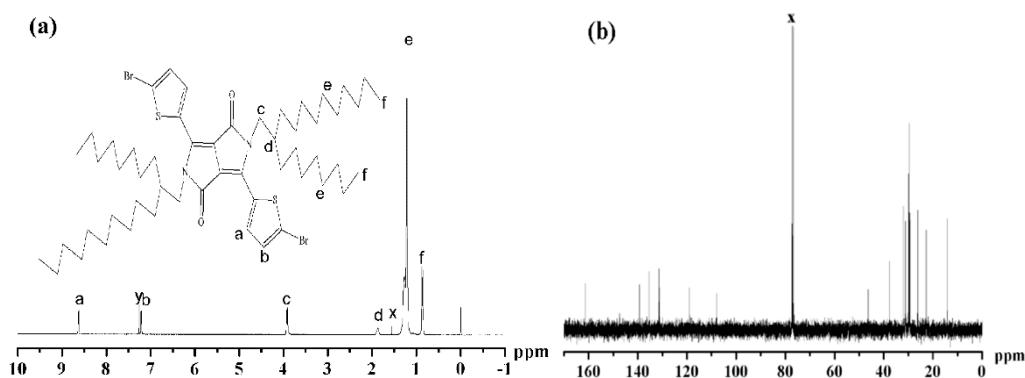
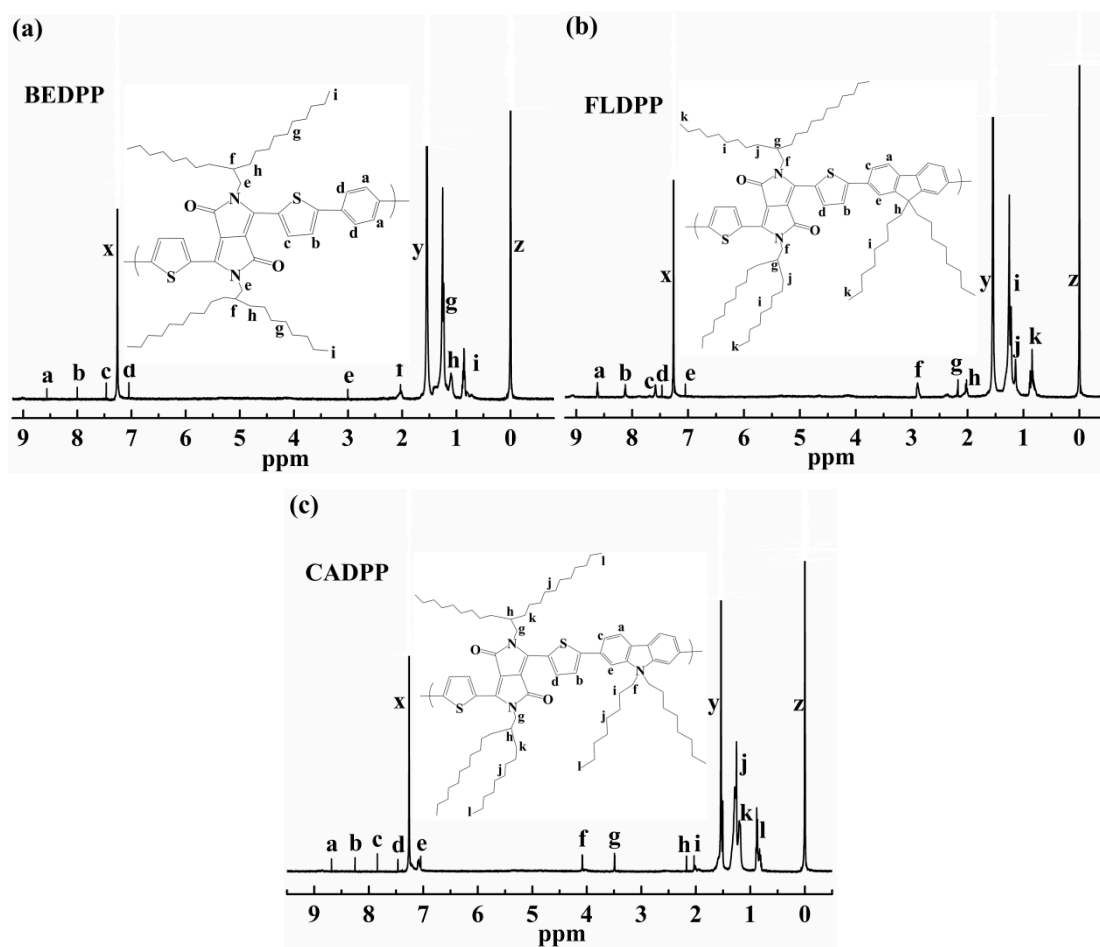
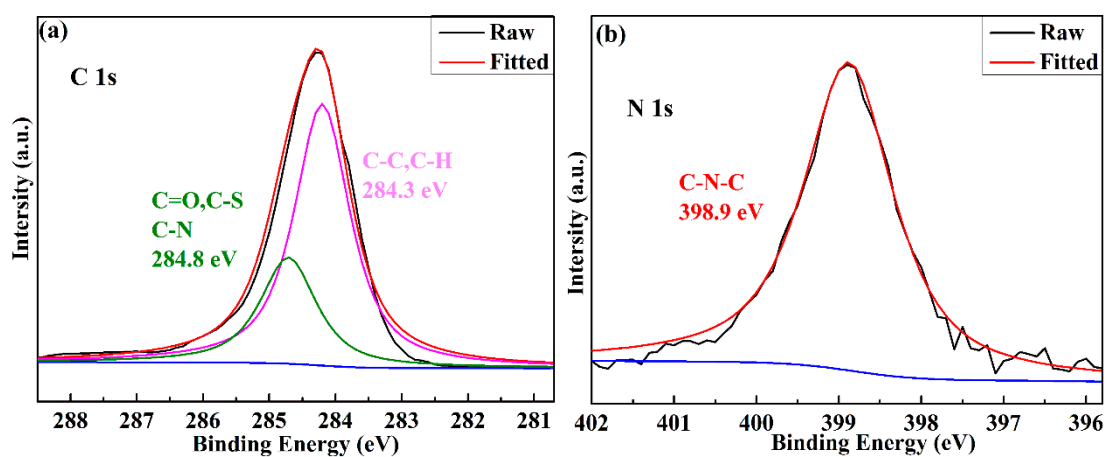


Figure S2. <sup>1</sup>H NMR (a) and <sup>13</sup>C NMR (b) spectra of monomer C.



**Figure S3.** NMR spectrum of BEDPP(a), FLDPP(b), CADPP(c),  $\text{CDCl}_3$  Solvent (7.26), water (1.54) and tetramethylsilane peaks (0) were marked by x, y, z, respectively.



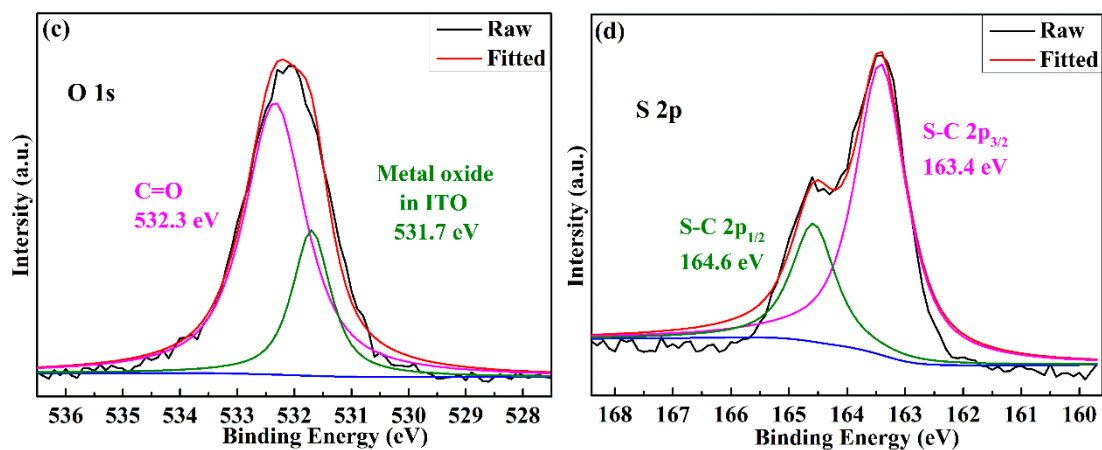


Figure S4. XPS spectra of polymer BEDPP: (a) C1s, (b) N1s, (c) O1s and (d) S2p.

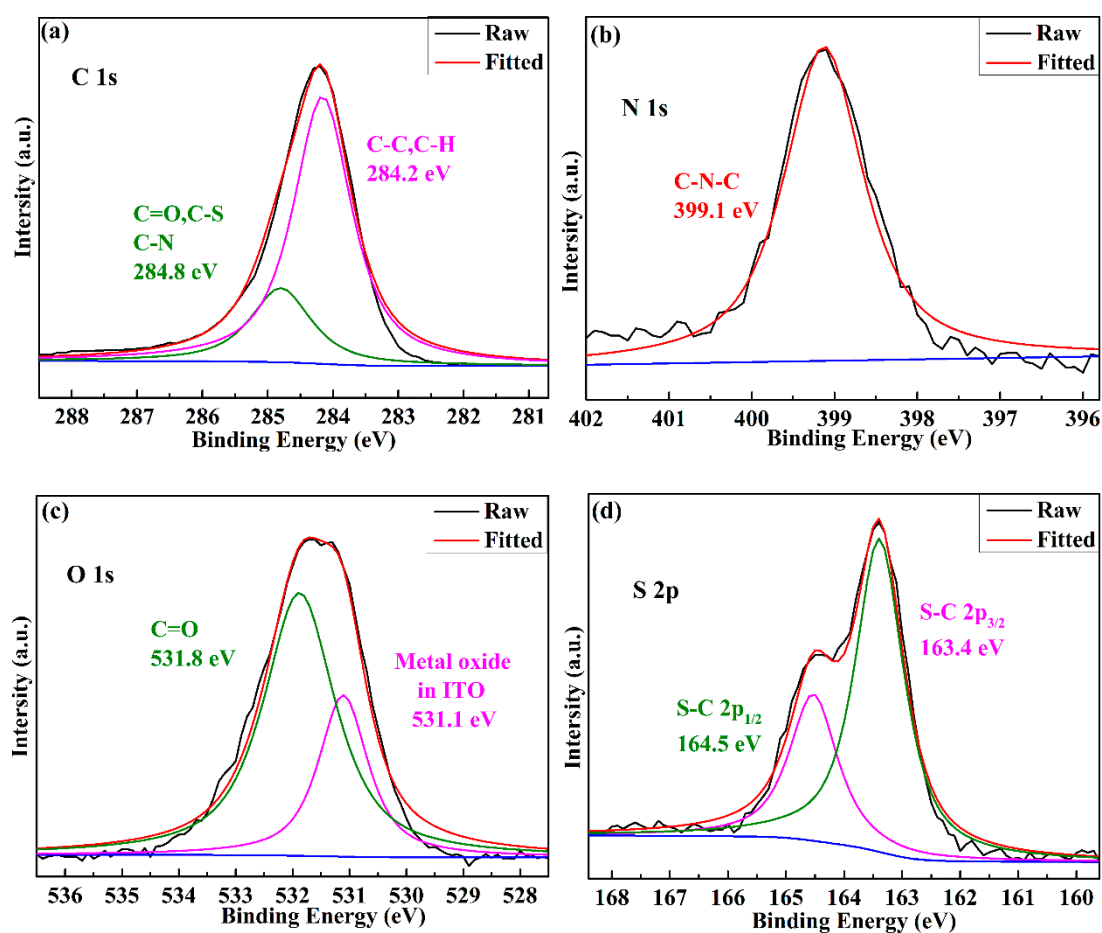
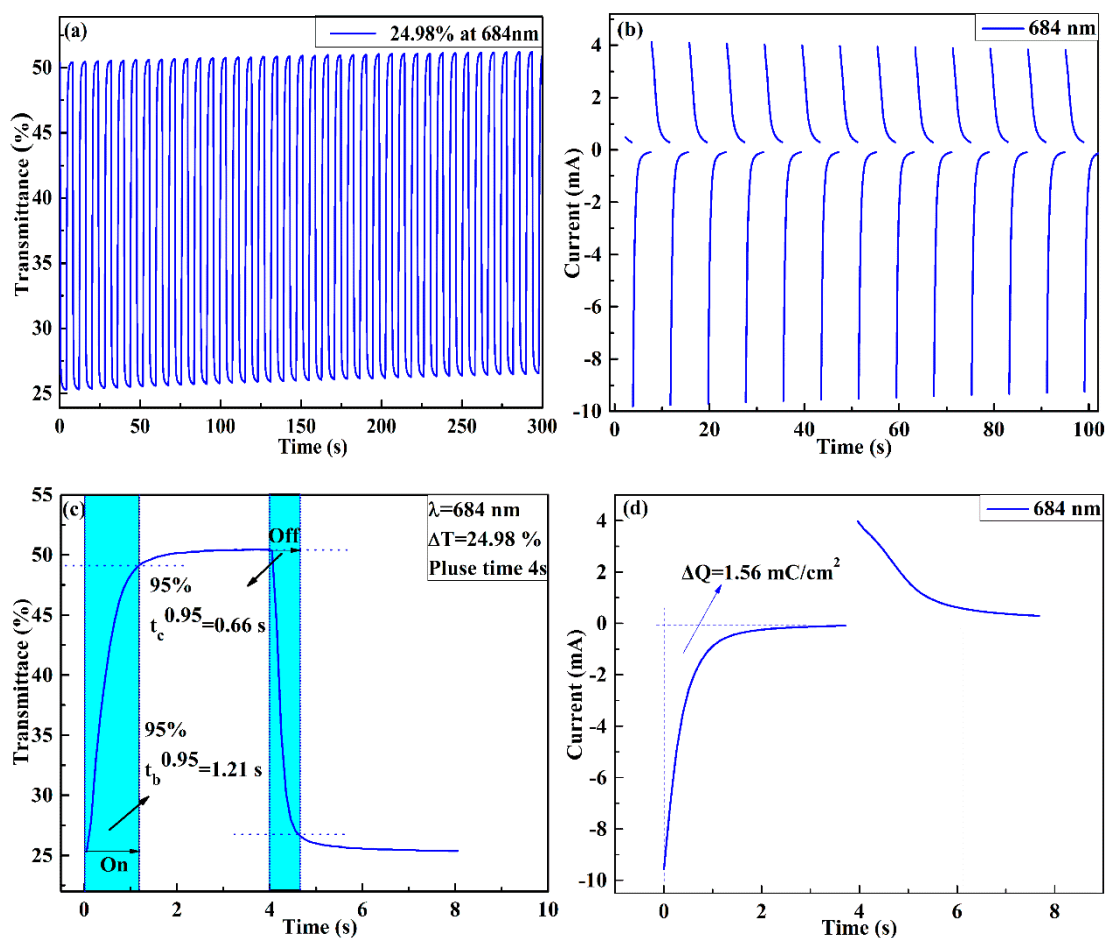
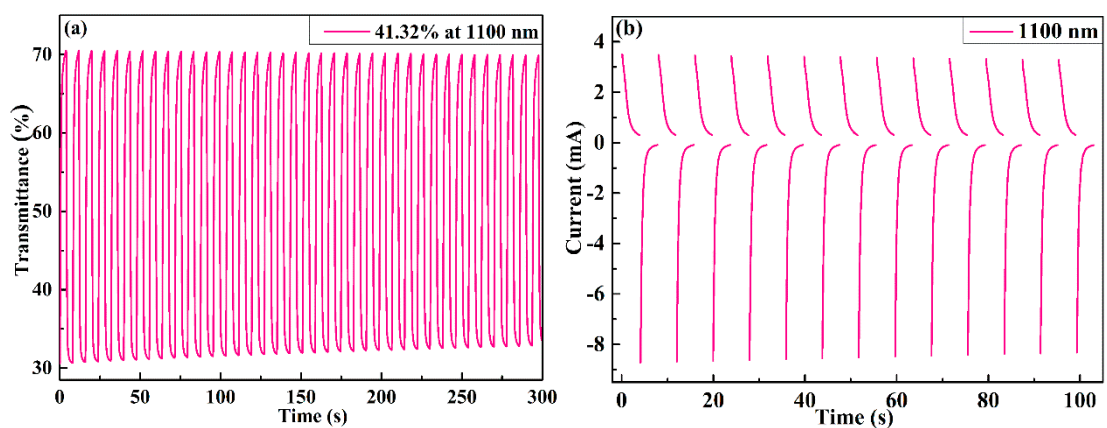
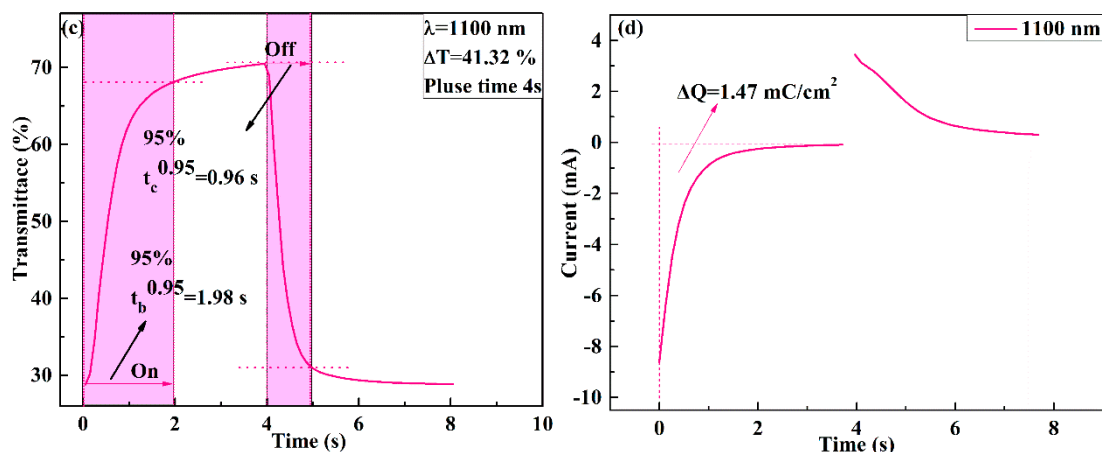


Figure S5. XPS spectra of polymer FLDPP: (a) C1s, (b) N1s, (c) O1s and (d) S2p.

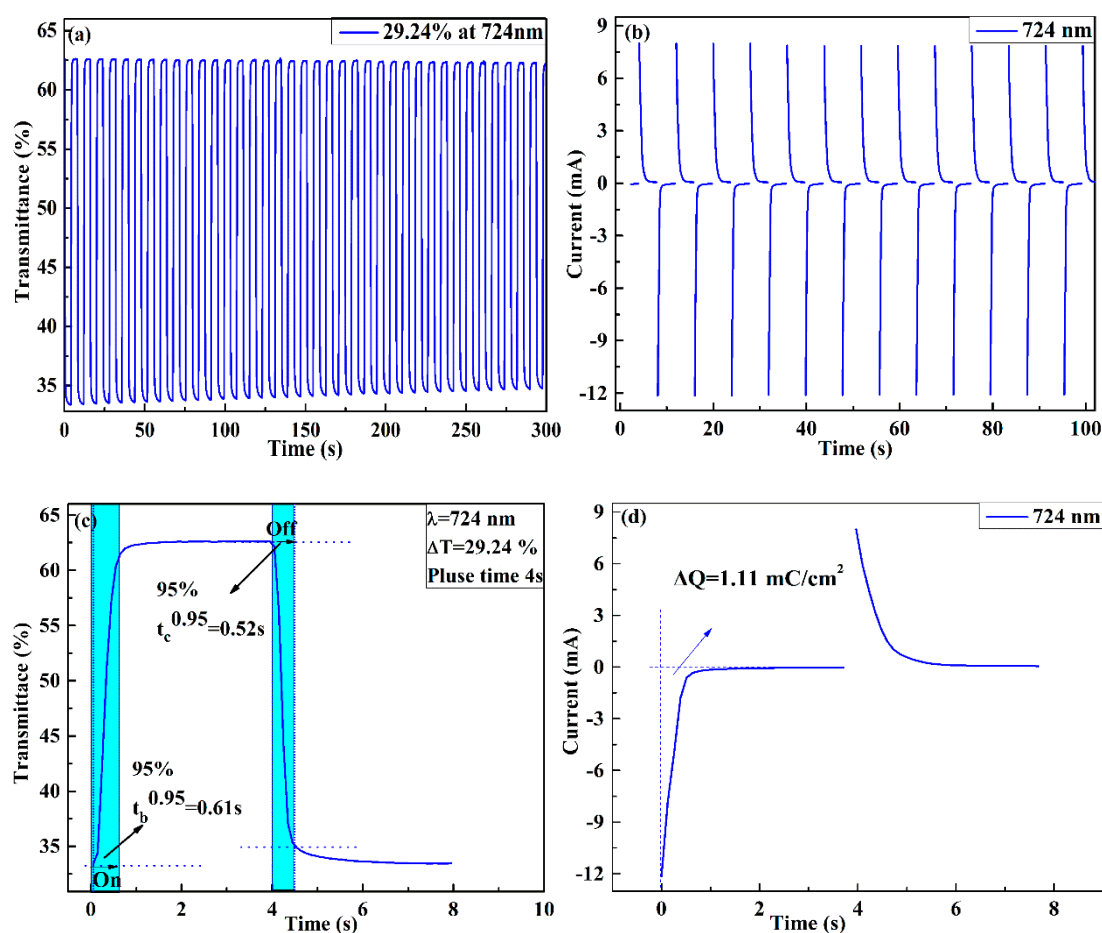


**Figure S6.** (a) Transmittance-time curve of BEDPP last for 300 s at 684 nm. (b) Current-time switching curve of BEDPP film between 0 V and 1.10 V in a time interval of 4 s. (c) The bleaching time ( $t_b$ ) and the coloration time ( $t_c$ ) of BEDPP at 684 nm. (d) The second cycle of current-time curve.

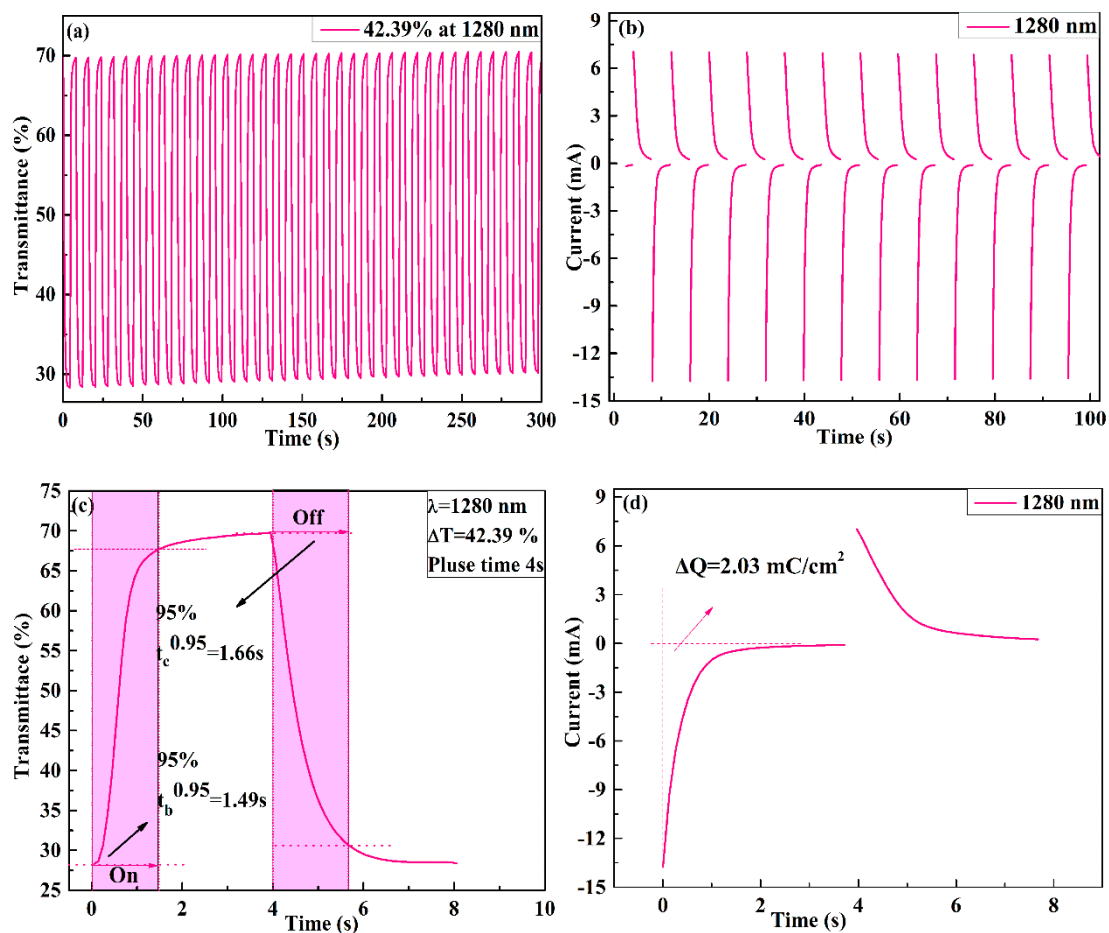




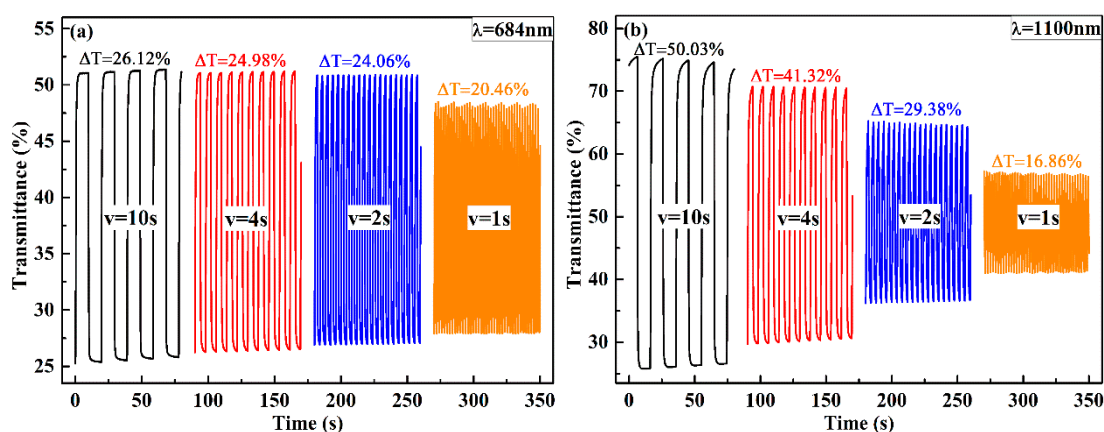
**Figure S7.** (a) Transmittance-time curve of BEDPP last for 300 s at 1100 nm. (b) Current-time switching curve of BEDPP film between 0 V and 1.10 V in a time interval of 4 s. (c) The bleaching time ( $t_b$ ) and the coloration time ( $t_c$ ) of BEDPP at 1100 nm. (d) The second cycle of current-time curve.



**Figure S8.** (a) Transmittance-time curve of FLDPP last for 300 s at 724 nm. (b) Current-time switching curve of FLDPP film between 0 V and 1.0 V in a time interval of 4 s. (c) The bleaching time ( $t_b$ ) and the coloration time ( $t_c$ ) of FLDPP at 724 nm. (d) The second cycle of current-time curve.



**Figure S9.** (a) Transmittance-time curve of FLDPP last for 300 s at 1280 nm. (b) Current-time switching curve of FLDPP film between 0 V and 1.0 V in a time interval of 4 s. (c) The bleaching time ( $t_b$ ) and the coloration time ( $t_c$ ) of FLDPP at 1280 nm. (d) The second cycle of current-time curve.



**Figure S10.** Electrochromic switching of BEDPP at 684 nm (a) and 1100 nm (b).

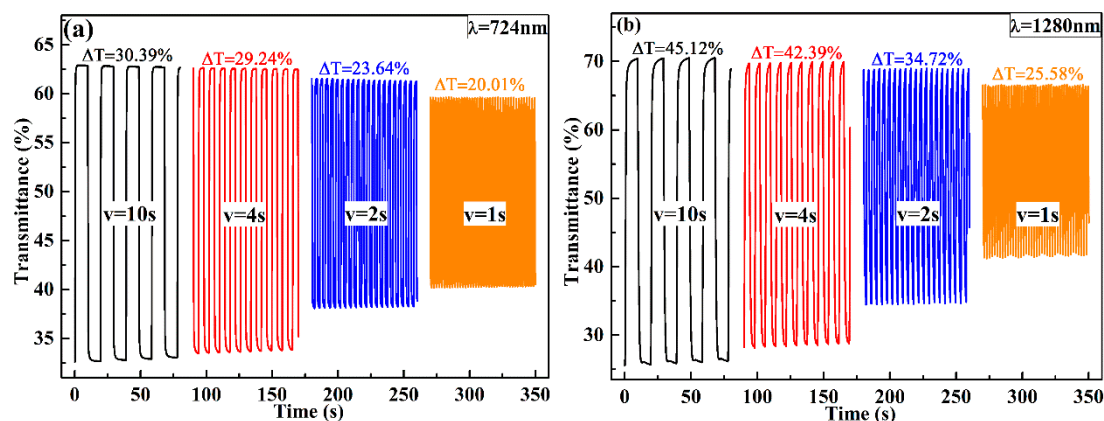


Figure S11. Electrochromic switching of FLDPP at 724 nm (a) and 1280 nm (b).

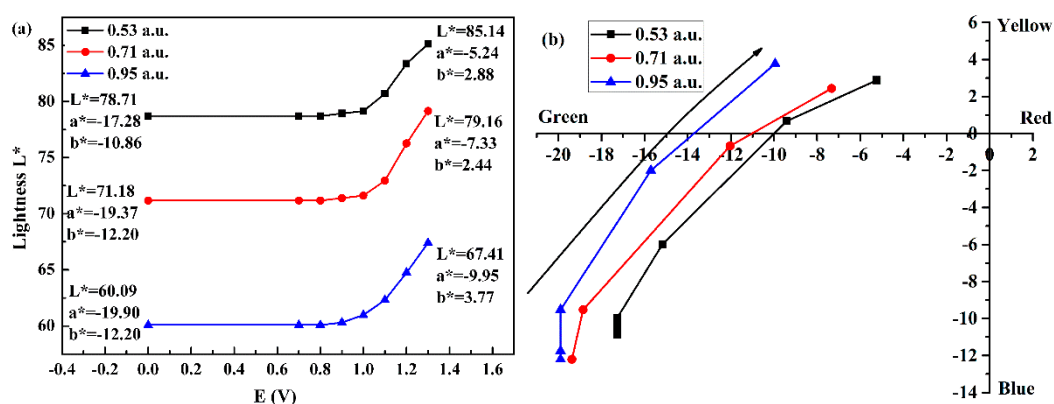


Figure S12. Lightness variation coordinates (a) and  $a^* - b^*$  values color space (b) of BEDPP during p-doping processing from neutral state to oxidized states based on three different thickness films. The direction of the arrows in (b) indicates the color changing trends of the polymer films.

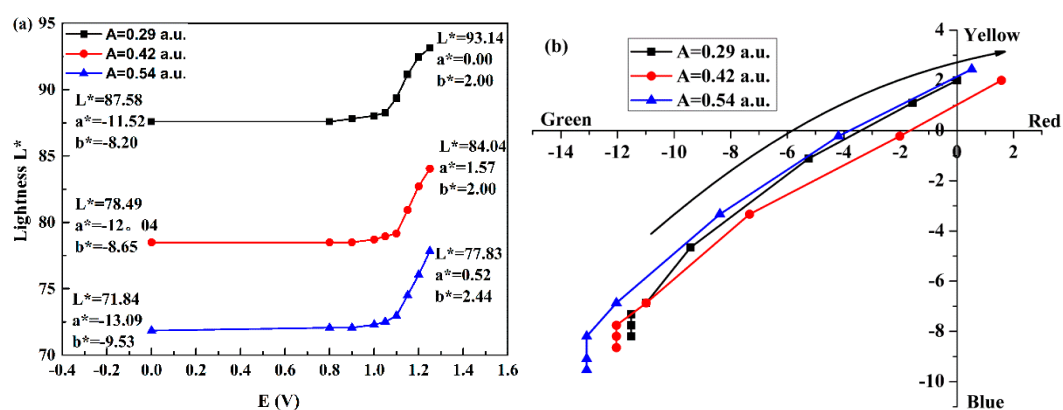


Figure S13. Lightness variation coordinates (a) and  $a^* - b^*$  values color space (b) of FLDPP during p-doping processing from neutral state to oxidized states based on three different thickness films. The direction of the arrows in (b) indicates the color changing trends of the polymer films.