Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

Self-powered quasi-solid-state electrochromic devices for optical information encryption

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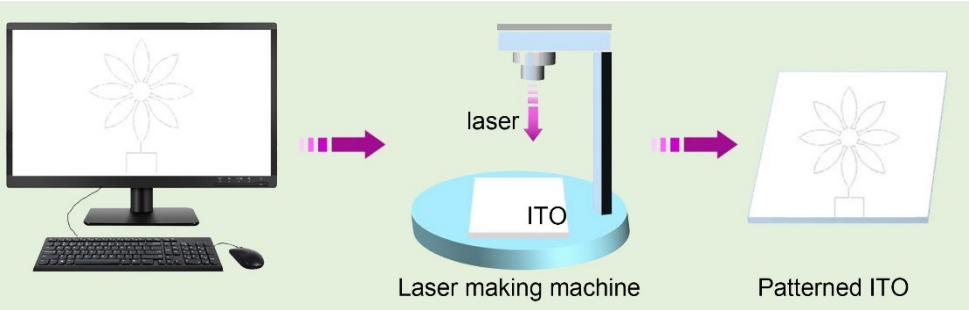

Figure S1. Schematic illustration showing the fabrication process of encrypted patterns on self-powered ECDs.

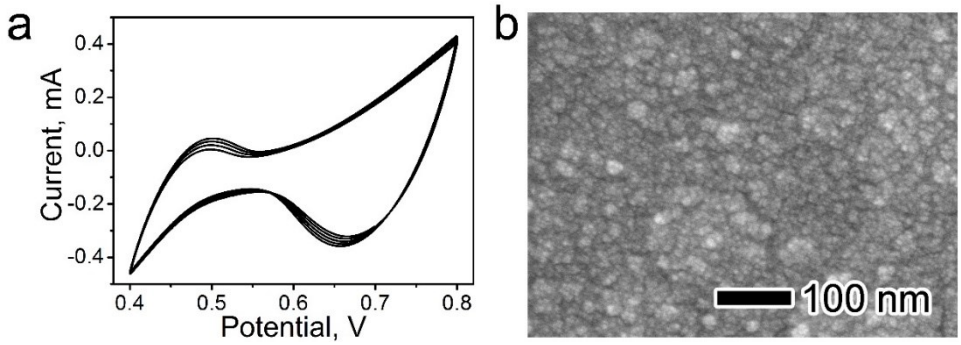

Figure S2. (a) The cyclic voltammogram of PB film deposited on ITO/PET substrate at a scan rate of 1 V s^{-1} using a three-electrode configuration, (b) the SEM image of PB film deposited on ITO/PET substrate.

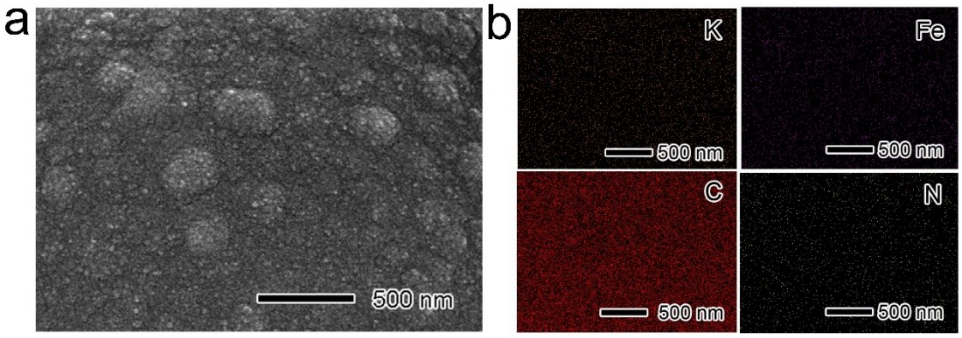

Figure S3. (a) SEM image and (b) elemental mapping of K, Fe, C and N of the PB film deposited on ITO/PET substrate.

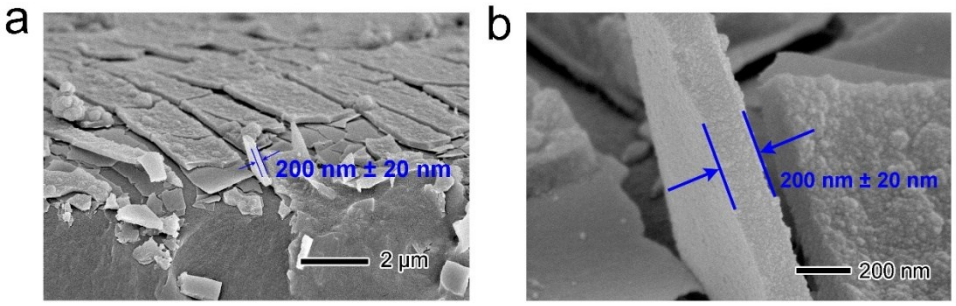

Figure S4. (a) Low-magnification and (b) high-magnification SEM images showing the cross-section of PB film deposited on ITO/PET substrate.

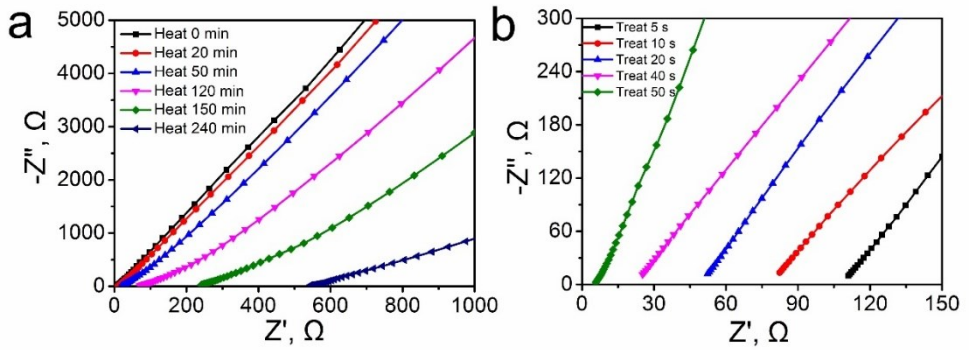

Figure S5. AC impedance spectra of the PAM/LiCl gel film by heating it at 90 °C (a) and treating in an aqueous solution of LiCl and $(NH_4)_2S_2O_8$ (b) with different time, respectively.

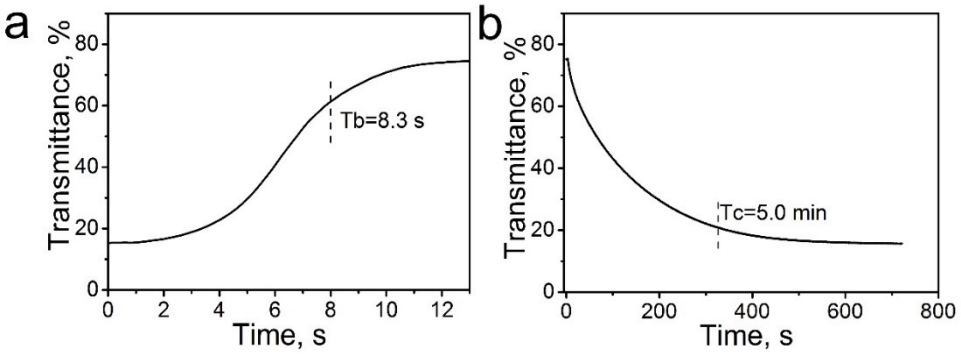

Figure S6. Change of light transmittance at wavelength 700 nm of the ECD versus time during bleaching (a) and coloration (b) processes after treating the self-powered ECD with an aqueous solution of LiCl and $(NH_4)_2S_2O_8$.

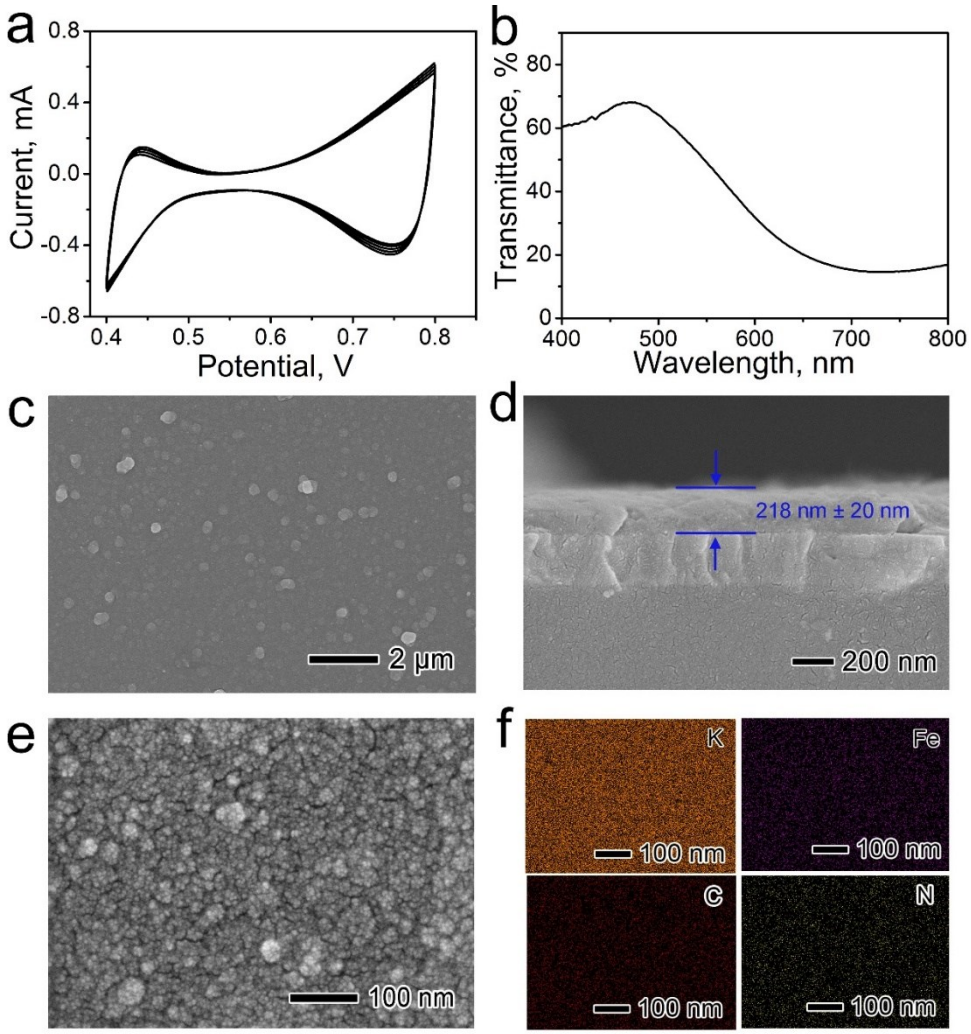

Figure S7. (a) The cyclic voltammogram of PB film deposited on ITO/Glass substrate at a scan rate of 1 V s^{-1} using a three-electrode configuration, (b) UV-Vis spectrum of the PB/ITO/Glass film, (c) low-magnification SEM image of PB/ITO/Glass film, (d) cross-sectional SEM image of PB/ITO/Glass film, (e) high-magnification SEM image and (f) elemental mapping of K, Fe, C and N of the PB/ITO/Glass film.

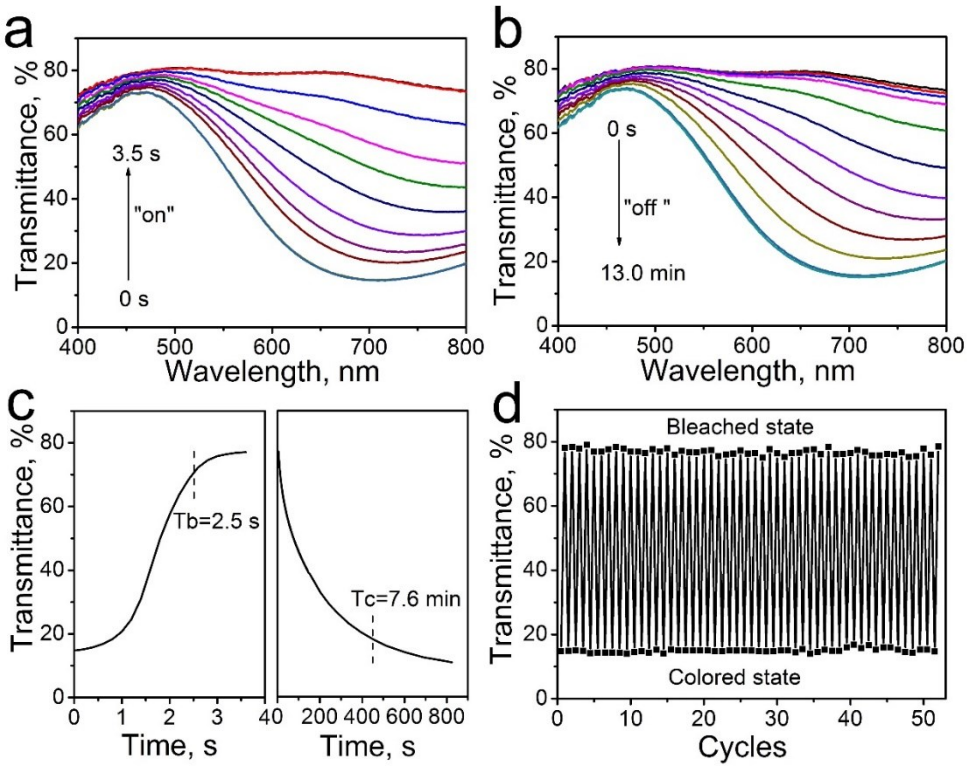

Figure S8. (a, b) UV−Vis transmittance spectra showing (a) the bleaching process and (b) coloration process upon connecting and disconnecting the Al wire between PB film and PAM/LiCl gel film in ambient air conditions of PB/ITO/Glass based ECD. (c) Change of light transmittance at wavelength 700 nm of the ECD versus time during bleaching (left) and coloration (right) processes, respectively. (d) Transmission intensity at 700 nm of the ECD recorded continuously over 50 cycles of color switching between bleached and colored states.

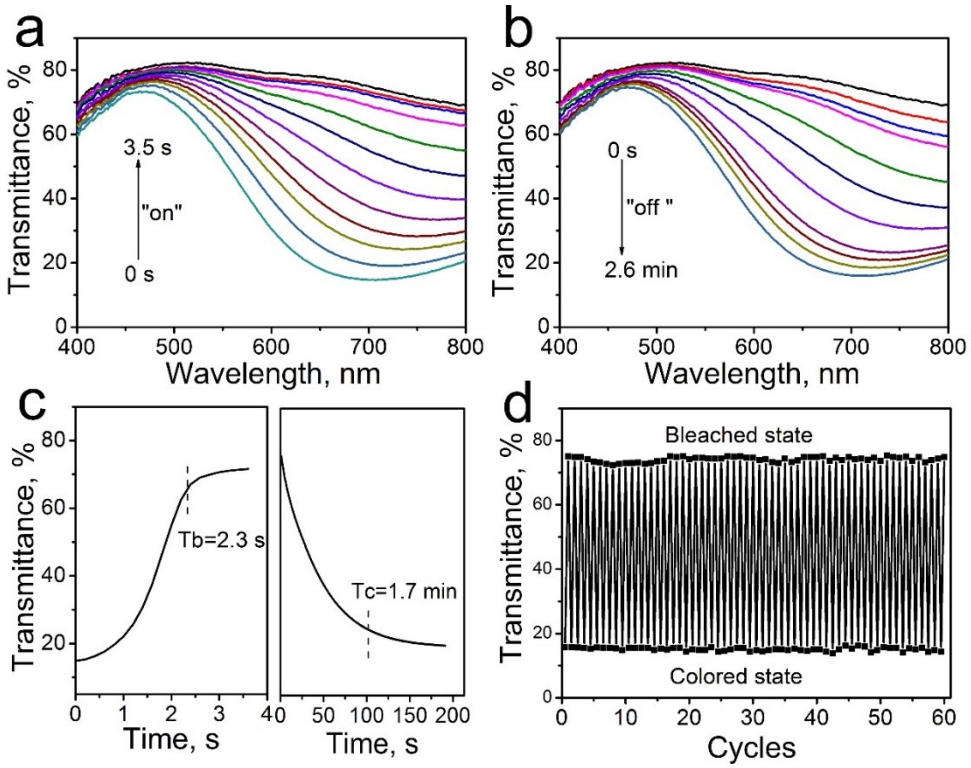

Figure S9. (a, b) UV−Vis transmittance spectra showing (a) the bleaching process and (b) coloration process upon connecting and disconnecting the Al wire between PB film and PAM/LiCl gel film in ambient air conditions after treating PB/ITO/Glass based ECD with an aqueous solution of LiCl and $(NH_4)_2S_2O_8$. (c) Change of light transmittance at wavelength 700 nm of the ECD versus time during bleaching (left) and coloration (right) processes, respectively. (d) Transmission intensity at 700 nm of the ECD recorded continuously about 60 cycles of color switching between bleached and colored states.

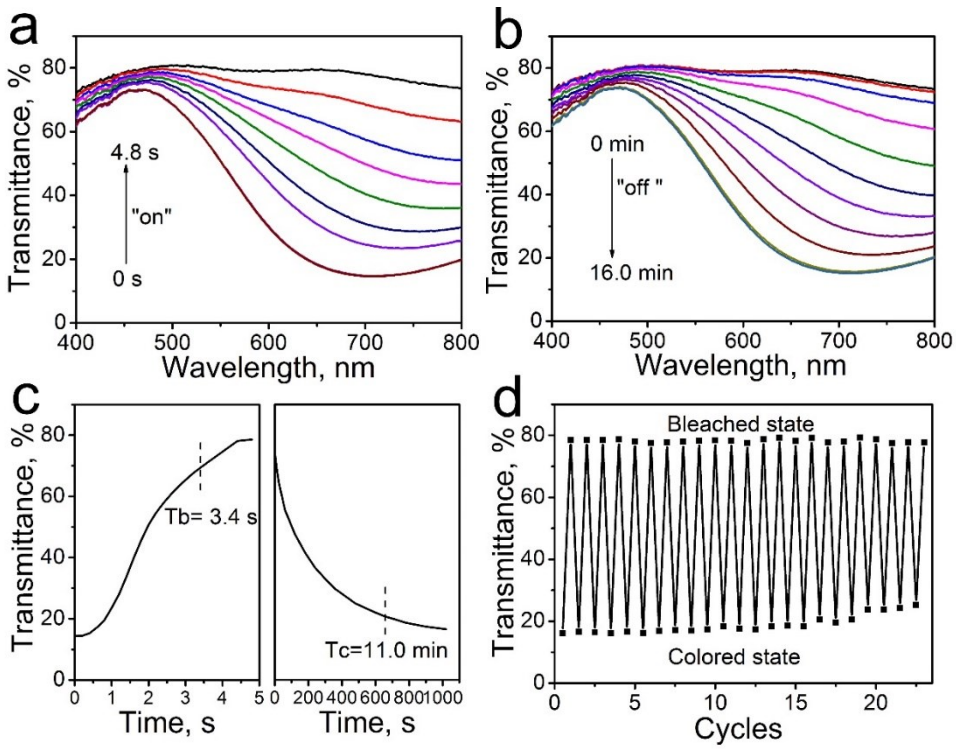

Figure S10. (a, b) UV−Vis transmittance spectra showing (a) the bleaching process and (b) coloration process upon connecting and disconnecting the Fe wire between PB film and PAM/LiCl gel film in ambient air conditions. (c) Change of light transmittance at wavelength 700 nm of the ECD versus time during bleaching (left) and coloration (right) processes, respectively. (d) Transmission intensity at 700 nm of the ECD recorded continuously over 20 cycles of color switching between bleached and colored states.

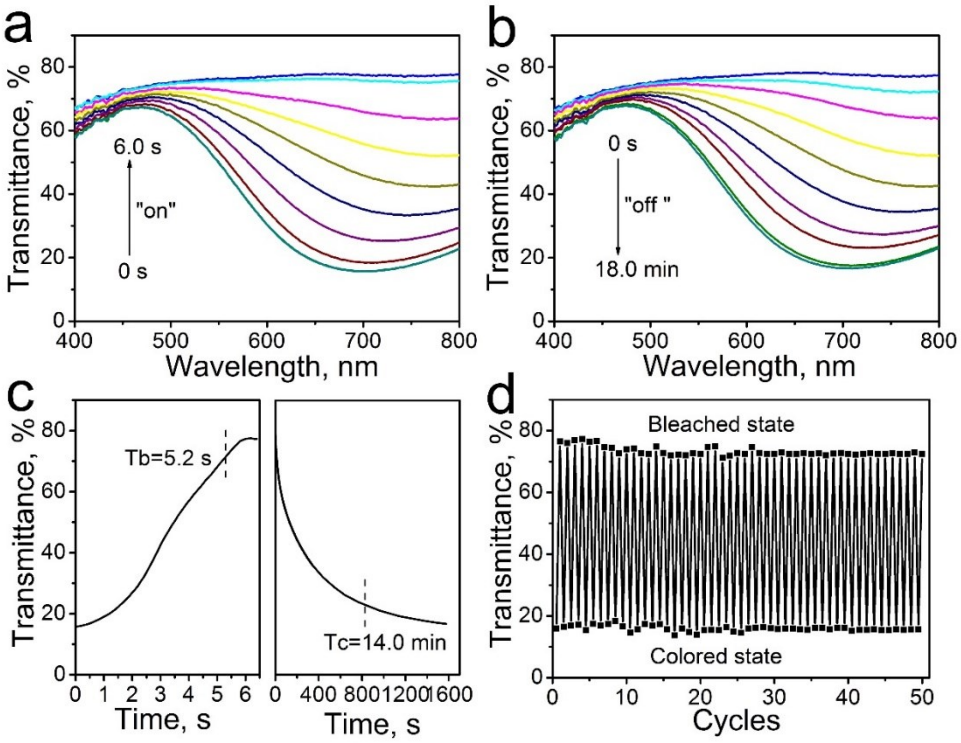

Figure S11. (a, b) UV−Vis transmittance spectra showing (a) the bleaching process and (b) coloration process upon connecting and disconnecting the steel wire between PB film and PAM/LiCl gel film in ambient air conditions. (c) Change of light transmittance at wavelength 700 nm of the ECD versus time during bleaching (left) and coloration (right) processes, respectively. (d) Transmission intensity at 700 nm of the ECD recorded continuously about 50 cycles of color switching between bleached and colored states.

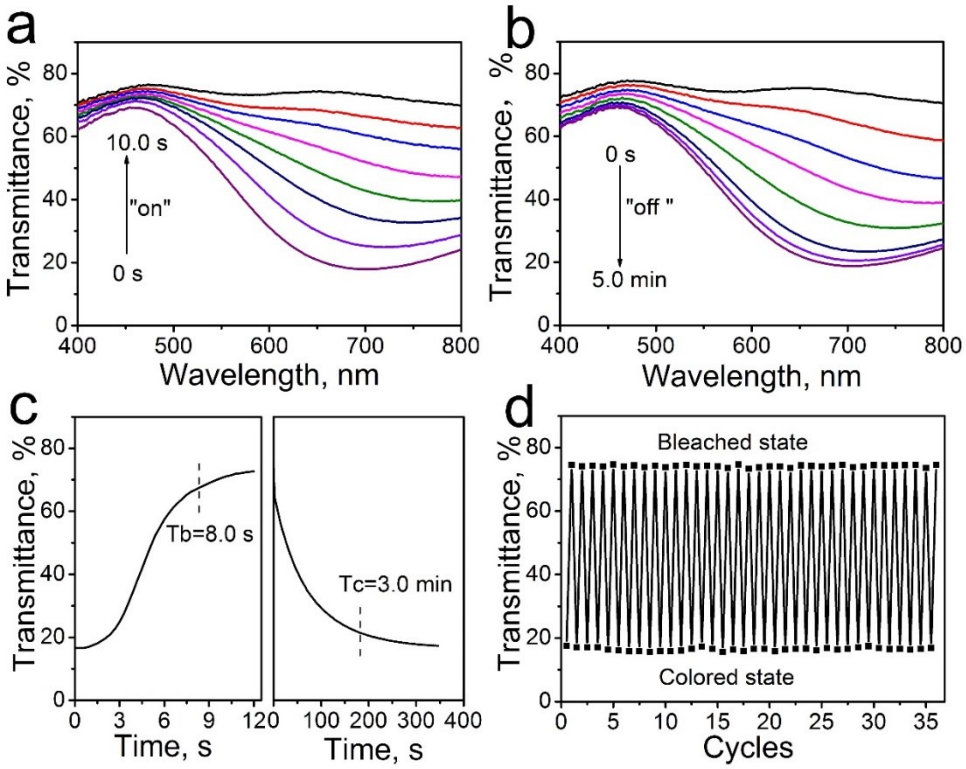

Figure S12. (a, b) UV−Vis transmittance spectra showing (a) the bleaching process and (b) coloration process upon connecting and disconnecting the Al wire between PB film and PAM/NaCl gel film in ambient air conditions. (c) Change of light transmittance at wavelength 700 nm of the ECD versus time during bleaching (left) and coloration (right) processes, respectively. (d) Transmission intensity at 700 nm of the ECD recorded continuously over 35 cycles of color switching between bleached and colored states.

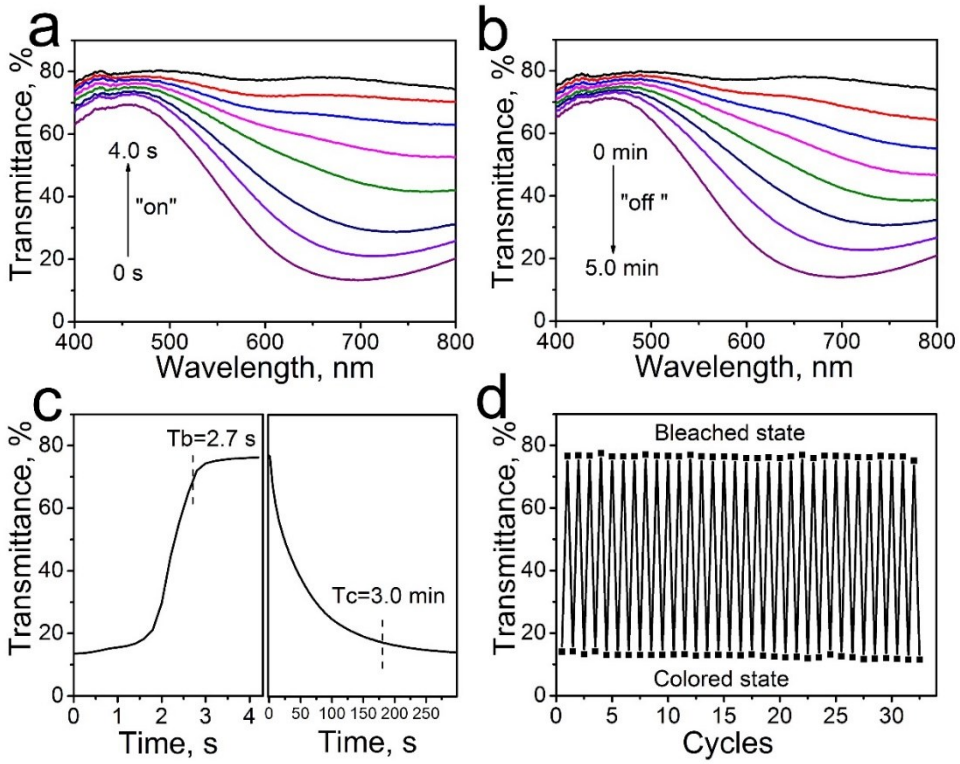

Figure S13. (a, b) UV−Vis transmittance spectra showing (a) the bleaching process and (b) coloration process upon connecting and disconnecting the Al wire between PB film and PAM/KCl gel film in ambient air conditions. (c) Change of light transmittance at wavelength 700 nm of the ECD versus time during bleaching (left) and coloration (right) processes, respectively. (d) Transmission intensity at 700 nm of the ECD recorded continuously over 30 cycles of color switching between bleached and colored states.

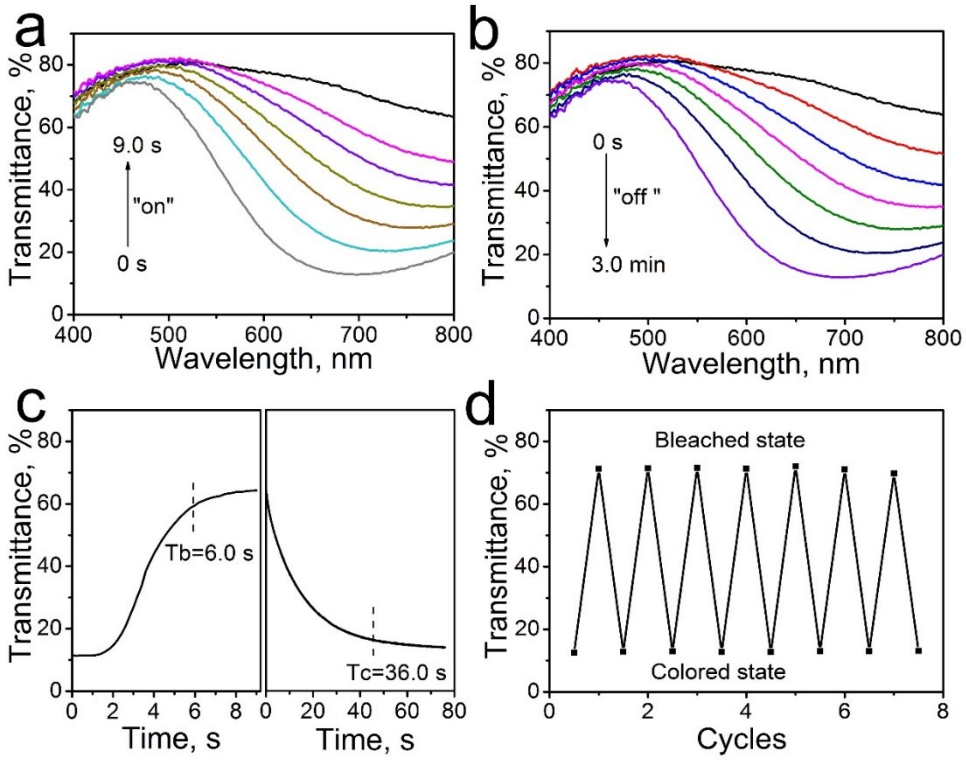

Figure S14. (a, b) UV−Vis transmittance spectra showing (a) the bleaching process and (b) coloration process upon connecting and disconnecting the Al wire between PB film and PVA/LiCl gel film in ambient air conditions. (c) Change of light transmittance at wavelength 700 nm of the ECD versus time during bleaching (left) and coloration (right) processes, respectively. (d) Transmission intensity at 700 nm of the ECD recorded continuously about 7 cycles of color switching between bleached and colored states.