SUPPLEMENTARY MATERIAL

Calculating of average visible optical modulation amplitude. The average visible optical modulation amplitude (ΔT_{vis}) can be calculated from the followed equation, where T_b and T_c are the transmittance of EC-cell in the state of bleached and colored, λ and Δλ are the scanning wavelength and scanning step.

$$\Delta T_{vis} = \frac{\sum_{\lambda=380}^{780}[T_b(\lambda)-T_c(\lambda)]}{(780-380)/\Delta\lambda} = \frac{\Delta\lambda}{400}\sum_{\lambda=380}^{780}[T_b(\lambda)-T_c(\lambda)]$$

The testing results of EC in the second type of system. The following figure shows the electrical properties of the EC-cell and the transmittance spectra at 650 nm in the process of bleaching.

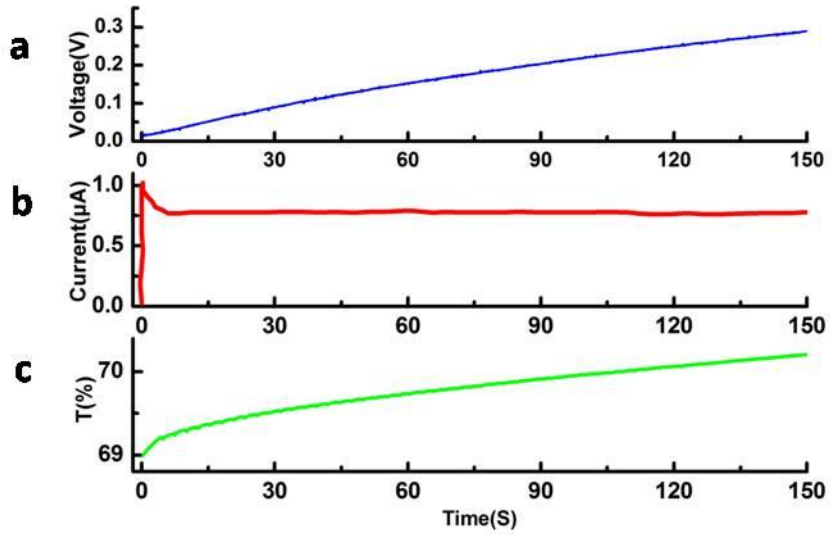

Fig.S1. The testing results of EC device with real-time power supply. (a)The V_t of the process of bleaching; (b) The I_t of the process of bleaching; (c) The transmittance of the process of bleaching.

The testing data of EC device by using a hardwire power source. A square wave signal (1.5v,2Hz) generated by a hardwire power source was applied to replace the NG for the purpose of further comparison. The measurement results are presented in the following figure. The upper figure and middle one are V_t and I_t curves of the EC-cell in the process of coloring and bleaching. The transmittance spectra of the EC device at 650 nm is recorded simultaneously and is shown in lower part. It indicates that the electrochromic response time of the EC device for coloring is about 8 second.

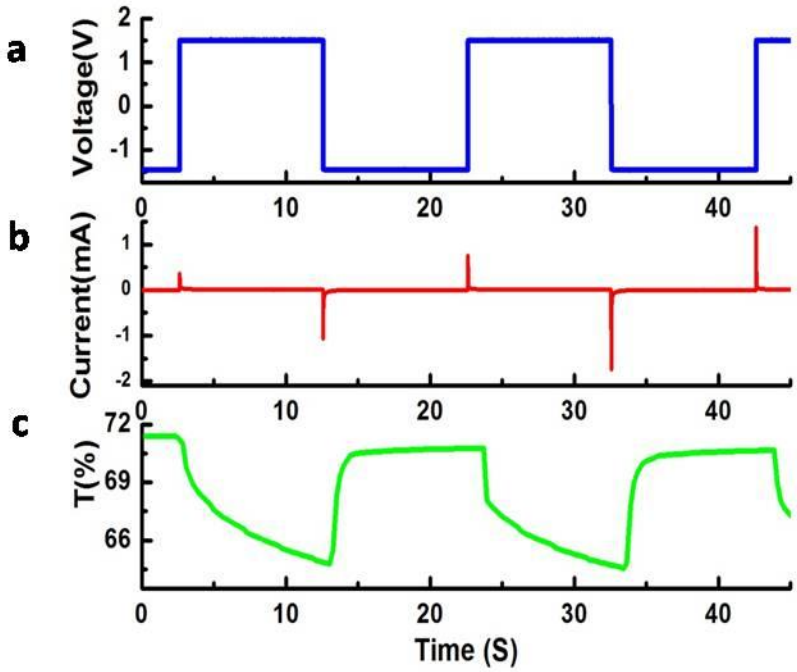

Fig.S2. The testing results of EC device powered by a square wave signal. (a)The V_t of the reversible electrochromic process; (b) The I_t of the reversible electrochromic process; (c) The transmittance of the reversible electrochromic process.

The parameter comparation of EC device driven by different power source. We compared the main parameters of EC device driven by the three types of power supply in this paper, which

are shown in the following table.

Table S1 The parameters of EC device driven by different power source

Power Source	**ERT (S)**	**ΔT_{vis} (%)**	**CE(cm^2/C)(λ=650nm)**
NG charged power	10	15.3	58.7
Real-time NG power	50	5.9	20.3
Hardwire power	8	17.2	53.2