Supporting Information

Long-Term-Stable, Solution-Processable, Electrochromic Carbon Nanotubes/Polymer Composite for Smart Supercapacitor with Wide Working Potential Window

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Fig. S1a. $^1$H NMR spectra of 2,7-Dibromo-9-(8-bromoctyl)-9H-carbazol in chloroform-d.

Fig. S1b. $^1$H NMR spectra of PBDTC in chloroform-d.
Fig. S2. FT-IR spectra of MWCNT-PBDTC and MWCNT-OH.

Fig. S3. The C1s XPS spectra of PBDTC and MWCNT-PBDTC.
**Fig. S4.** FE-SEM image of MWCNT-OH.

**Fig. S5.** Comparison of solubility of the samples in chloroform: (a) MWCNT-PBDTC, (b) MWCNT-OH. The black dispersion shown in (a) is stable for at least 30 days. The concentration for each sample is 5 mg mL\(^{-1}\).

**Table 1.** Performance of symmetric supercapacitor device.

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<tr>
<th>E (W h kg(^{-1}))</th>
<th>P (W kg(^{-1}))</th>
<th>E (×10(^{-3}) mW h cm(^{-2}))</th>
<th>P (mW cm(^{-2}))</th>
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<td>174.7</td>
<td>4800</td>
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<td>148.2</td>
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</tr>
<tr>
<td>120.0</td>
<td>48000</td>
<td>12.00</td>
<td>4.80</td>
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Fig. S6. (a) Leakage current curve of MWCNT-PBDTC device charged at 2 mA to 4.8 V and kept at 4.8 V for 5000 s. (b) Self-discharge curve of MWCNT-PBDTC device after charging at 4.8 V for 15 min.

Fig. S7. In situ optical responses of device for 30 s per step measured at 465 nm and the calculation of response times.