Supporting Information

Trifluoromethyl functionalized polyindoles: Electrosyntheses, characterization, and improved capacitive performance

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1. Calculation of the polymer mass
To obtain the accurate mass of each polymer material, the current efficiency ($\eta$) of polymerization (i.e., the charge consumed by growth of the polymer film with respect to the total charge passed through the cell) was measured along with the weight ($W_p$) of the polymer (in the de-doped state) deposited on the electrode according to equation (1). Note that $W_p$ was obtained by weighing the polymer mass due to the use of a large electrode (2 cm $\times$ 2 cm) as the working electrode.

$$\eta = \left( \frac{nF W_p}{M} \right) / Q \times 100\%$$

where, $n$ is the number of electrons consumed by the reaction of one molecule (here $n$ is 2), $F$ is Faraday constant (96,485 C mol$^{-1}$), $Q$ is the integrated charge passed through the cell during film growth, $M$ is the molar mass of the monomer.

The mass ($W$) of polymers deposited on the small electrode can be accurately calculated by the equations (2,3).

$$W = \frac{(\eta Q_d)(M)}{FZ}$$

$$f = \frac{2Q_0}{\eta Q_d - Q_0}$$

where, $Z$ is the number of electrons transferred per monomer attached to the polymer, in which $Z = 2 + f$. $f$ is the doping levels of polymer films. $\eta Q_d$ is the charge used for the polymer film growth and $Q_o$ is the total charge of oxidized species in the polymer films.

To compare the electrochemical properties of different polymers, the mass of polymer films in this work was controlled as 3.3 $\mu$g according to the calculated current efficiencies and doping levels (Table S1).
Figure S1. Contact angles of 5-PFMIn and 6-PFMIn.

Figure S2. Specific capacitance of 5-FMIn, 6-FMIn, 5-MIn and 6-MIn as the function of monomer concentration (A) and deposition potential (B) used to preparation of corresponding polymers.
**Figure S3.** Cyclic voltammetry curves of 5-PFMIn (A), 6-PFMIn (B), 5-PMIn (C) and 6-PMIn (D) with various scan rates in the range of 5 to 200 mV s\(^{-1}\) in 1 M H\(_2\)SO\(_4\) aqueous solution.
Figure S4. Cathodic current as function of scan rate and the square root of scan rate of 5-PFMI\(_n\) (A) (B), 6-PFMI\(_n\) (C) (D), 5-PMI\(_n\) (E) (F) and 6-PMI\(_n\) (G) (H).
Figure S5. Galvanostatic charge/discharge of 5-PFMIn (A), 6-PFMIn (B), 5-PMIn (C) and 6-PMIn (D) at different current densities in 1 M H₂SO₄ aqueous solution.
Figure S6. Nyquist plots of 5-PFMIn, 6-PFMIn, 5-PMIn and 6-PMIn before and after the cycling 5000 times in 1 M H$_2$SO$_4$ aqueous solution.

<table>
<thead>
<tr>
<th></th>
<th>5-PFMIn</th>
<th>6-PFMIn</th>
<th>5-PMIn</th>
<th>6-PMIn</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\eta$ / %</td>
<td>72</td>
<td>75</td>
<td>70</td>
<td>64</td>
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<tr>
<td>$f$</td>
<td>0.14</td>
<td>0.18</td>
<td>0.18</td>
<td>0.12</td>
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Table S1 The calculated values for the electropolymerization.

References
