Supporting information

Optical and electrical properties of dithienothiophene based conjugated polymers: Medium donor vs weak, medium, and strong acceptor

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Figure S1. (A) FP-TRMC transients ($\lambda_{ex} = 355$ nm) of Pw with different weight percentages of PDI films (0-20 wt %) relative to 100 wt % of Pw. (B) Corresponding transient absorption spectra ($\lambda_{ex} = 355$ nm) with the kinetic traces at 720 nm shown in the inset.

Table S1. FP-TRMC and TAS values of Pm with different wt % of PDI

<table>
<thead>
<tr>
<th>Wt % PDI</th>
<th>$\phi \Sigma \mu_{max}$ (10$^{-4}$ cm$^2$/Vs)</th>
<th>$\phi$</th>
<th>$\Sigma \mu$ (10$^{-2}$ cm$^2$/Vs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 wt%</td>
<td>2.0</td>
<td>1.3 x 10$^2$</td>
<td>1.6</td>
</tr>
<tr>
<td>5 wt%</td>
<td>2.7</td>
<td>1.4 x 10$^2$</td>
<td>1.9</td>
</tr>
<tr>
<td>10 wt%</td>
<td>3.0</td>
<td>1.5 x 10$^2$</td>
<td>2.0</td>
</tr>
<tr>
<td>20 wt%</td>
<td>4.2</td>
<td>1.8 x 10$^2$</td>
<td>2.4</td>
</tr>
</tbody>
</table>

$\Sigma \mu = 2.0 \times 10^{-2}$

Table S2. FP-TRMC and TAS values of Pw with different wt % of PDI

<table>
<thead>
<tr>
<th>Wt % PDI</th>
<th>$\phi \Sigma \mu_{max}$ (10$^{-4}$ cm$^2$/Vs)</th>
<th>$\phi$</th>
<th>$\Sigma \mu$ (10$^{-2}$ cm$^2$/Vs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 wt%</td>
<td>0.37</td>
<td>5.0 x 10$^{-3}$</td>
<td>0.74</td>
</tr>
<tr>
<td>10 wt%</td>
<td>0.40</td>
<td>6.6 x 10$^{-3}$</td>
<td>0.61</td>
</tr>
<tr>
<td>20 wt%</td>
<td>0.49</td>
<td>1.6 x 10$^{-2}$</td>
<td>0.31</td>
</tr>
</tbody>
</table>

$\Sigma \mu = 5.5 \times 10^{-3}$
**Figure S2.** Normalized fluorescence spectra of $P_{s2}$ in chloroform ($\lambda_{\text{exc}} = 600$ nm)

**Figure S3.** Cyclic voltammogram of $P_{s2}$ in film state.
Figure S4. (A) and (C) show the output characteristics of $P_w$ and $P_{s2}$ respectively with $W = 3000 \, \mu m$ and $L = 100$ and $50 \, \mu m$ respectively for $P_w$ and $P_{s2}$. (B) and (D) are the transfer characteristics of $P_w$ and $P_{s2}$. 