Supporting Information for


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Structural characterization.

SI-1a) $^1$H NMR spectra of 2,7-dibromo-9,9-bis(6-(3-pentadecylphenoxy)hexyl)-9H-fluorene (1) and 2, 2',(9, 9-bis(6-(3-pentadecylphenoxy)hexyl)-9H-fluorene-2, 7-diyl)bis(4, 4, 5, 5-tetramethyl-1, 3, 2-dioxaborolane) (2).
SI-1b) Size exclusion chromatography of monomers 1 and 2.

SI-1c) MALDI of the 2, 7-dibromo-9,9-bis(6-(3-pentadecylphenoxy)hexyl)-9H-fluorene
SI-1d) MALDI of the 2, 2'- (9, 9-bis(6-(3-pentadecylphenoxy)hexyl)-9H-fluorene-2, 7-diyl)bis(4, 4, 5, 5-tetramethyl-1, 3, 2-dioxaborolane)

SI-1e) The size exclusion chromatography of all polymers.
Thermogravimetric Analysis (TGA) of all polymers

![TGA graph showing weight loss vs. sample temperature for different polymers](image-url)
SI-2) (a, b) DSC heating and cooling curves (2\textsuperscript{nd} cycles) of PDP-PF and PDPPF-co-PF at a heating and cooling rate of 2\textdegree C/min. (c, d) PLM images of PDP-PF and PDPPF-co-PF at 25\textdegree C and 60\textdegree C respectively.

![DSC curves and PLM images](image-url)
SI-3) TEM images of the polymers PDP-PF (top) and PDPPF-co-Ph (bottom)
SI-4) CIE color coordinate diagram for the change of color from blue to green upon addition of bilirubin to PDPPF-co-Ph in THF.
Absorption (left) and emission (right) spectra of PDP-PF, POF-co-Ph and POF in THF upon addition of bilirubin (0 µM - 10 µM)
SI-6) Excitation spectrum of PDPPF-co-Ph with addition of various amounts of bilirubin. 
Excitation wavelength-503nm
The equations used for calculating the donor–acceptor distance ($r$), spectral overlap integral $J(\lambda)$, forster distance ($R_0$), and Energy transfer efficiency ($E$)$^{1-3}$

$$r = R_0 \frac{1}{(1 - E)^{1/6}}$$  \hspace{1cm} 1

$$J(\lambda) = \int f_D(\lambda) \varepsilon_A(\lambda) \lambda^4 d\lambda$$  \hspace{1cm} 2

$$R_0 = 0.2108 \left( \frac{k^2 n^4 Q_D J(\lambda)}{Q_D J(\lambda)} \right)^{1/6} \text{ (in A$^0$)}$$  \hspace{1cm} 3

$$E = 1 - \frac{F_{DA}}{F_D}$$  \hspace{1cm} 4

Where $f_D(\lambda)$ is the corrected fluorescence intensity of donor in the wavelength range $\lambda$ to $\lambda + \Delta \lambda$ with total intensity (area under the curve) normalized to unity. $\varepsilon_A(\lambda)$ is the extinction coefficient of the acceptor at $\lambda$, which is typically in units of M$^{-1}$cm$^{-1}$, orientation factor $K$ is usually assumed to be equal to 2/3 when both donor and acceptor are free to undergo unrestricted isotropic motion, $n$ is the refractive index of the medium, $Q_D$ is the quantum yield of the donor, $F_D$ and $F_{DA}$ were the fluorescence intensities of donor, in the absence and presence of acceptor respectively.


SI-7) Quenching of fluorescence of 0.1OD solutions of polymers in THF upon addition of 1x10$^{-5}$ M bilirubin.
SI-8) Structure of Biliverdin, Rhodamine and 5, 10, 15, 20-tetra(4-pyridyl)-21H, 23H-porphine (TPY)

![Chemical structures of Biliverdin, Rhodamine, and TPY.](image)

SI-9): Fluorescence spectrum for THF/water containing NaOH (75:25) sensing. [PDPPF-co-Ph] = 8x10^{-6}M, and [bilirubin] = 1x10^{-6}M to 1x10^{-5}M. Excitation wavelength = 367 nm.

![Fluorescence spectrum graph.](image)
Table-S1: Parameters ($\tau$: decay time, $\alpha$: pre-exponential factor, $\chi^2$: chi-squared value) retrieved from the biexponential fit. The decay time was collected for polyfluorene emission at 410 nm by using nano LED 375 nm for excitation. The average lifetime was $<\tau>$ calculated as $<\tau> = \Sigma a_i \tau_i^2 / \Sigma a_i \tau_i$.

<table>
<thead>
<tr>
<th>Sample</th>
<th>$\tau_1$ (ps)</th>
<th>$\tau_2$ (ps)</th>
<th>$a_1$</th>
<th>$a_2$</th>
<th>Average lifetime $&lt;\tau&gt;$ (ps)</th>
<th>$\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDP-PF</td>
<td>536</td>
<td>675</td>
<td>0.23</td>
<td>0.77</td>
<td>636</td>
<td>1.063</td>
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<tr>
<td>PDP-PF + BR (1x10$^{-5}$M)</td>
<td>102</td>
<td>609</td>
<td>0.02</td>
<td>0.98</td>
<td>606</td>
<td>1.05</td>
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<tr>
<td>PDPPF-co-Ph</td>
<td>211</td>
<td>495</td>
<td>0.35</td>
<td>0.65</td>
<td>441</td>
<td>1.008</td>
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<tr>
<td>PDPPF-co-Ph + BR (1x10$^{-5}$M)</td>
<td>38</td>
<td>253</td>
<td>0.3</td>
<td>0.7</td>
<td>239</td>
<td>1.05</td>
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<tr>
<td>POF</td>
<td>134</td>
<td>422</td>
<td>-0.15</td>
<td>1.0</td>
<td>408</td>
<td>1.04</td>
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<tr>
<td>POF + BR (1x10$^{-5}$M)</td>
<td>377</td>
<td>515</td>
<td>0.67</td>
<td>0.33</td>
<td>432</td>
<td>1.08</td>
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<tr>
<td>POF-co-Ph</td>
<td>119</td>
<td>436</td>
<td>0.18</td>
<td>0.82</td>
<td>433</td>
<td>1.03</td>
</tr>
<tr>
<td>POF-co-Ph + BR (1x10$^{-5}$M)</td>
<td>67</td>
<td>419</td>
<td>0.15</td>
<td>0.85</td>
<td>409</td>
<td>1.07</td>
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