Supporting information for:

DNA Sequence-Dependent Photoluminescence Enhancement in a Cationic Conjugated Polyelectrolyte

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Materials and methods

Homo and hetero oligonucleotides were purchased from Integrated DNA Technologies. C-PPV and N-PPV were synthesized as reported in literature.[1,2] Spectroscopic experiments were performed in 10mM phosphate buffered saline (PBS, pH=7.4). UV-Vis absorption and fluorescence spectroscopy were performed on a Perkin Elmer Lambda 20 spectrophotometer and a Cary Eclipse fluorimeter, respectively, in the later case using 460 nm excitation. Circular dichroism (CD) spectroscopy was performed with a Jasco J-815 spectrophotometer. The pH measured from all C-PPV/ssDNA complexes after mixing in 10mM phosphate buffer was around 7.0, indicating negligible pH effects on the absorbance and fluorescence of C-PPV. The PL enhancement reported in Table 1 and in Fig.S1 was calculated as

$$\mathrm{PL_{enhancement}} = \frac{\mathrm{I_{C-PPV/DNA}}}{\mathrm{I_{C-PPV}}} * \frac{\mathrm{OD_{C-PPV}}}{\mathrm{OD_{C-PPV/DNA}}} \quad (1)$$

with I_{PPV} and $I_{PPV/DNA}$ the integrated areas under the PL spectra of C-PPV and C-PPV/DNA, and with $OD_{C\text{-}PPV}$ and $OD_{C\text{-}PPV/DNA}$ the absorbances of C-PPV and C-PPV/DNA at 460 nm, for C-PPV and DNA.

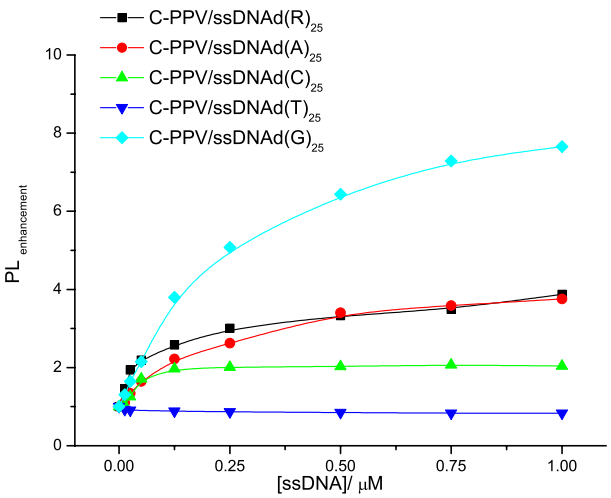

Figure S1. PL enhancement vs ssDNA concentration in 10 mM PBS (pH=7.4). C-PPV concentration was 0.3 μM. PL enhancement was calculated according to eq.1, SI.

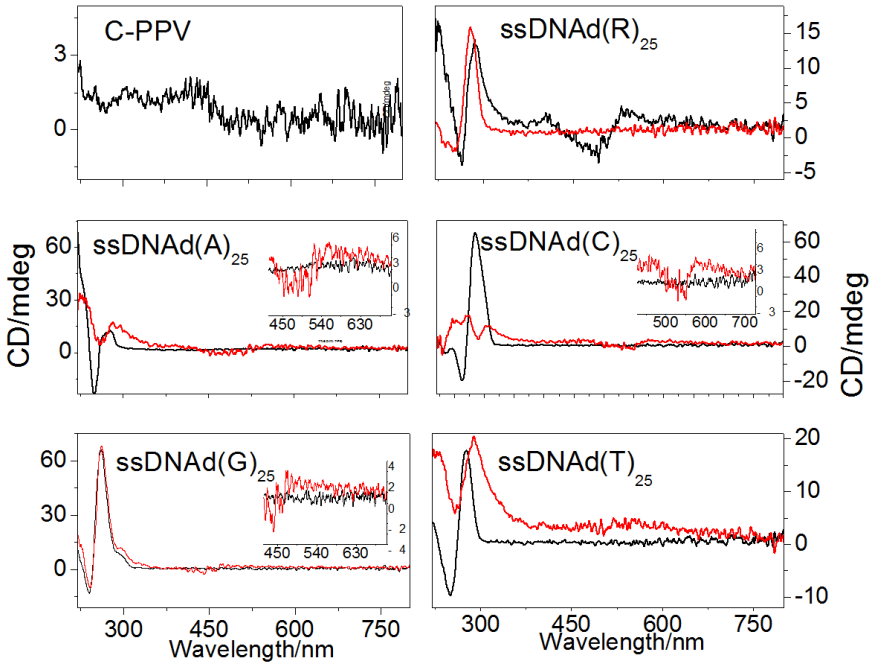

Figure S2. CD spectroscopy of C-PPV (a) (red color), DNA (b-f) (black color) and C-PPV/DNA complexes (b-f) (red color). C-PPV:DNA molar ratio 1:3 with C-PPV 1 μM in 10 mM PBS buffer. Insets in panels (c), (d) and (e) are zooms of the visible region of the CD spectra.

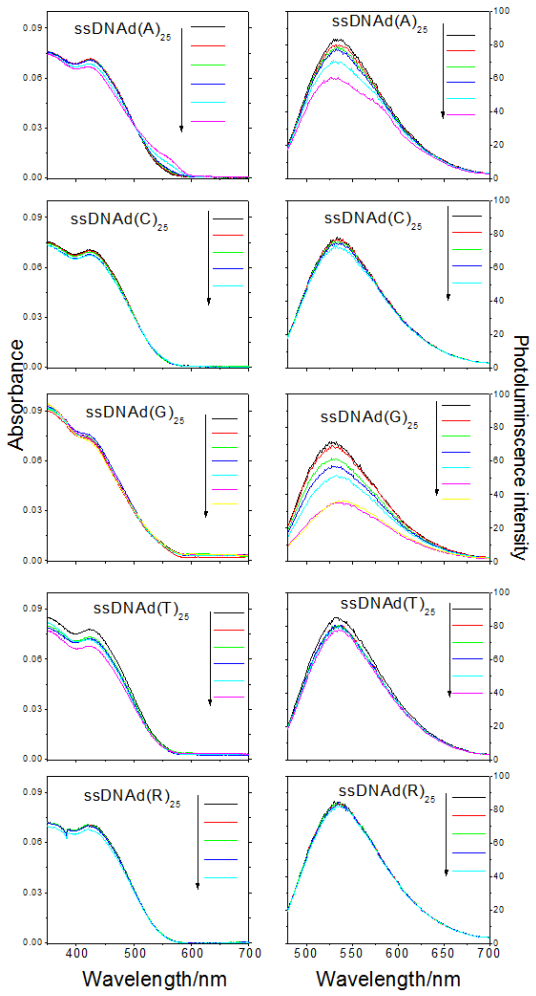

Figure S3. Uv-vis absorption spectra (left panels) and PL spectra (right panels) of N-PPV (black curves) and N-PPV/DNA mixtures (colored graphs) for various DNA oligos and with varying N-PPV:DNA molar ratio, from 10:1 to 1:3 (arrows indicate increased DNA concentration). N-PPV was 0.5 µM in concentration.

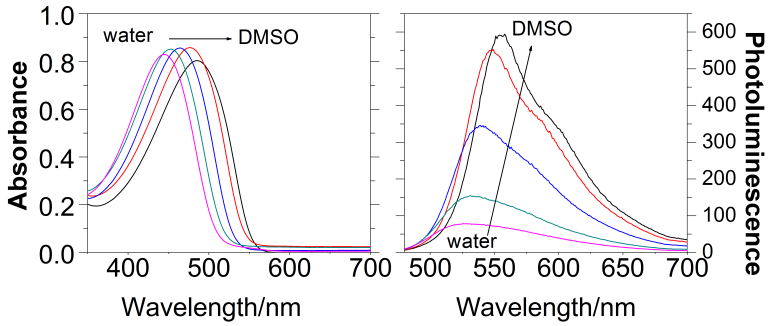

Figure S4. Absorption and PL spectra of C-PPV in water/DMSO mixed solvent. Arrows indicate increased content of DMSO, from 0% (pink curves) up to 100% (black curves).

References:

1. Gao, Y.; Wang, C.-C.; Wang, L.; Wang, H.-L., Conjugated polyelectrolytes with pH-dependent conformations and optical properties. Langmuir 2007, 23 (14), 7760-7767;

2 Wang, C.-C.; Tsai, H.; Shih, H.-H.; Jeon, S.; Xu, Z.; Williams, D.; Iyer, S.; Sanchez, T. C.; Wang, L.; Cotlet, M.; Wang, H.-L., Synthesis and Characterization of Ethylene Glycol Substituted Poly(phenylene Vinylene) Derivatives. Acs Applied Materials & Interfaces 2010, 2 (3), 738-747.