Perturbation of Fluorescence by Non-Specific Interactions Between Anionic Poly(phenylenevinylene)s and Proteins: Implications for Biosensors

Stephen J. Dwight, Brent S. Gaylord, Janice W. Hong,
and Guillermo C. Bazan*
Departments of Chemistry and Materials, University of California, Santa Barbara, CA 93106
Institute for Polymers and Organic Solids
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* Bazan@chem.ucsb.edu

Supporting Information

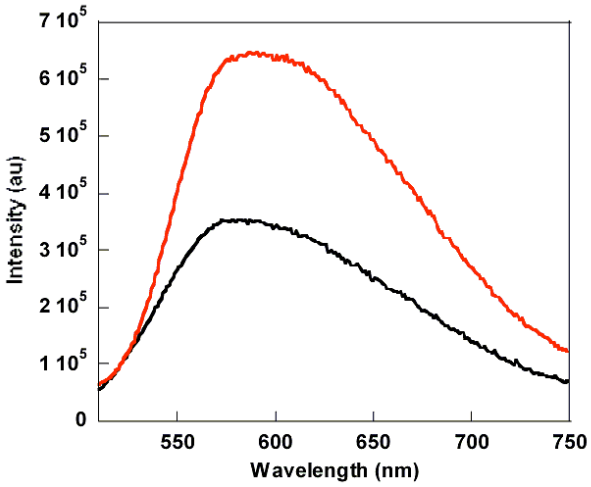

Figure S1: Fluorescence spectra (λ_{ex} = 500 nm) in water: **Na^+-MPS-PPV** ([RU] = 1.7 x 10^{-5} M) (black line) and **Na^+-MPS-PPV** and [avidin] = 5 x 10^{-7} M (red line).

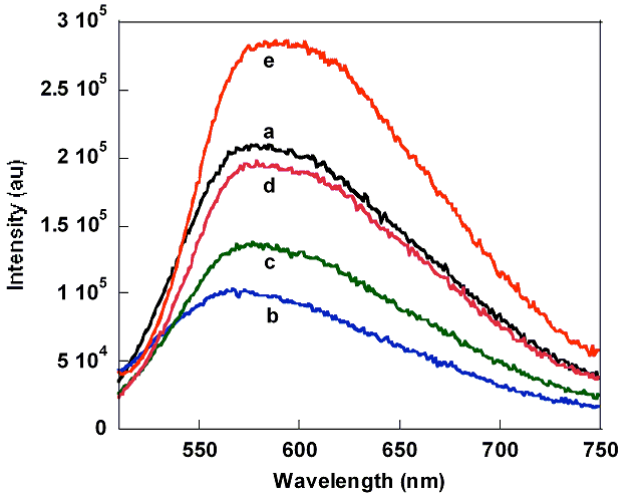

Figure S2: Fluorescence spectra (λ_{ex} = 500 nm) in water: (a) **Na^+-MPS-PPV** ([RU] = 1 x 10^{-5} M) (black line); (b) **Na^+-MPS-PPV** and [**BPP^+**] = 3.2 x 10^{-7} M (blue line); (c) **Na^+-MPS-PPV**, **BPP^+**, and [avidin] = 3 x 10^{-8} M (green line); (d) **Na^+-MPS-PPV**, **BPP^+**, and [avidin] = 8 x 10^{-8} M (pink line); (e) **Na^+-MPS-PPV**, **BPP^+**, and [avidin] = 2.7 x 10^{-7} M (red line).

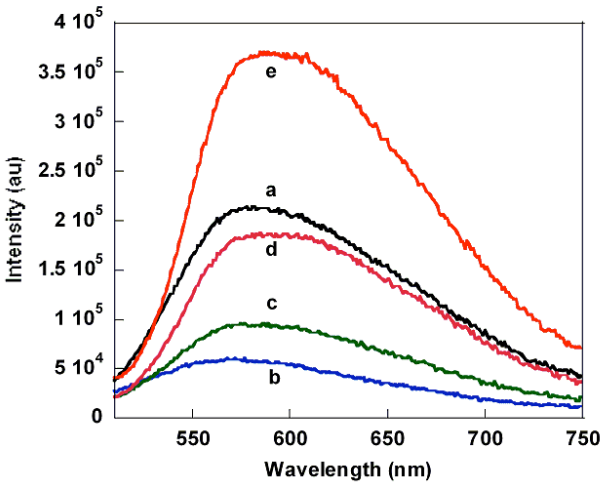

Figure S3: Fluorescence spectra (λ_{ex} = 500 nm) in water: (a) **Na^+-MPS-PPV** ([RU] = 1 x 10^{-5} M) (black line); (b) **Na^+-MPS-PPV** and [**mMV^+**] = 3.2 x 10^{-7} M (blue line); (c) **Na^+-MPS-PPV**, **mMV^+**, and [avidin] = 2.4 x 10^{-8} M (green line); (d) **Na^+-MPS-PPV**, **mMV^+**, and [avidin] = 8 x 10^{-8} M (pink line); (e) **Na^+-MPS-PPV**, **mMV^+**, and [avidin] = 2.8 x 10^{-7} M (red line).

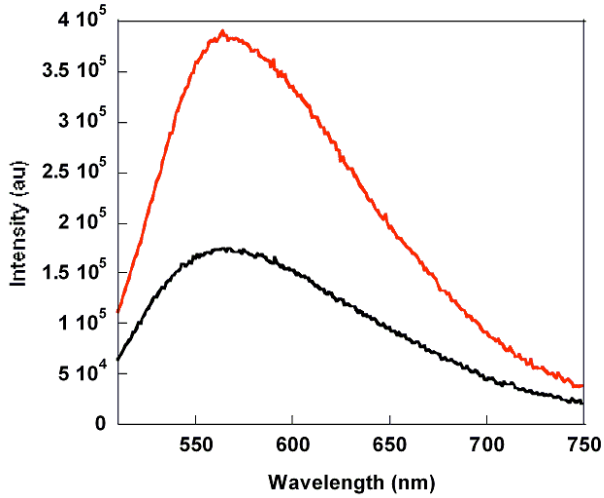

Figure S4: Fluorescence spectra (λ_{ex} = 500 nm) in water: **Li^+-MPS-PPV** ([RU] = 1.7 x 10^{-5} M) (black line) and **Li^+-MPS-PPV** and [Tau] = 1 x 10^{-7} M (red line).

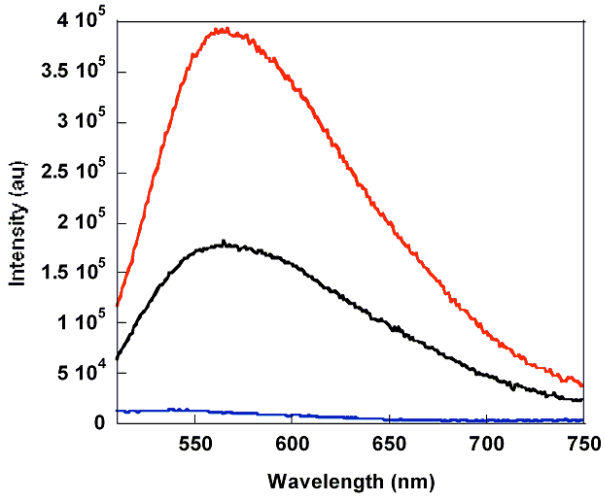

Figure S5: Fluorescence spectra (λ_{ex} = 500 nm) in water: **Li$^+$-MPS-PPV** ([RU] = 1.7 x 10^{-5} M) (black line); **Li$^+$-MPS-PPV** and [**BPP$^+$**] = 2 x 10^{-6} M (blue line); **Li$^+$-MPS-PPV**, **BPP$^+$**, and [Tau] = 1 x 10^{-7} M (red line).

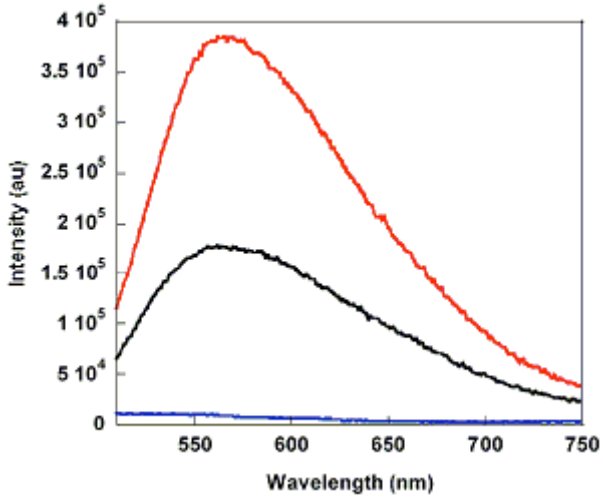

Figure S6: Fluorescence spectra (λ_{ex} = 500 nm) in water: **Li$^+$-MPS-PPV** ([RU] = 1.7 x 10^{-5} M) (black line); **Li$^+$-MPS-PPV** and [**mMV$^+$**] = 2 x 10^{-6} M (blue line); **Li$^+$-MPS-PPV**, **mMV$^+$**, and [Tau] = 1 x 10^{-7} M (red line).

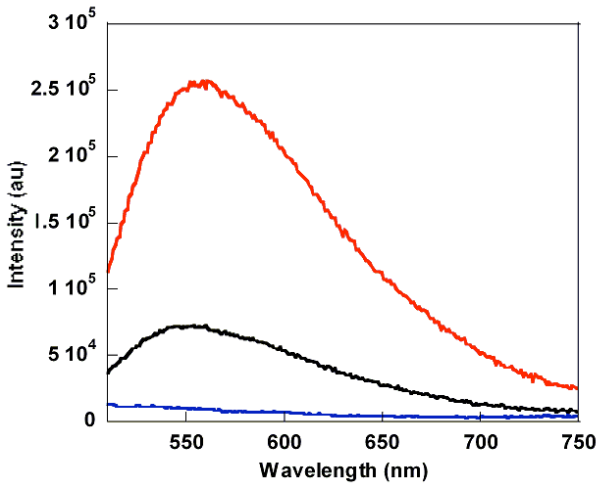

Figure S7: Fluorescence spectra (λ_{ex} = 500 nm) in water: **Li$^+$-MPS-PPV** ([RU] = 1.7 x 10^{-5} M) (black line); **Li$^+$-MPS-PPV** and [**mMV$^+$**] = 2 x 10^{-6} M (blue line); **Li$^+$-MPS-PPV**, **mMV$^+$**, and [pepsin-A] = 3 x 10^{-7} M (red line).

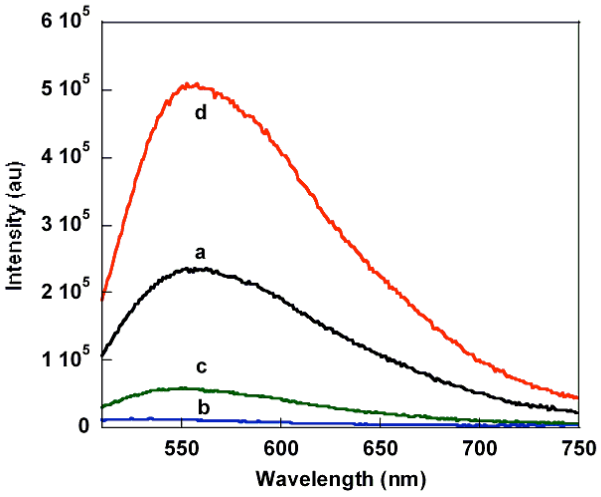

Figure S8: Fluorescence spectra (λ_{ex} = 500 nm) in water: (a) **Li$^+$-MPS-PPV** ([RU] = 1.7 x 10^{-5} M) (black line); (b) **Li$^+$-MPS-PPV** and [**BPP$^+$**] = 2 x 10^{-6} M, (blue line); (c) **Li$^+$-MPS-PPV**, **BPP$^+$**, and [pepsin-A] = 3 x 10^{-7} M (green line); (d)**Li$^+$-MPS-PPV** and [pepsin-A] = 3 x 10^{-7} M (red line).

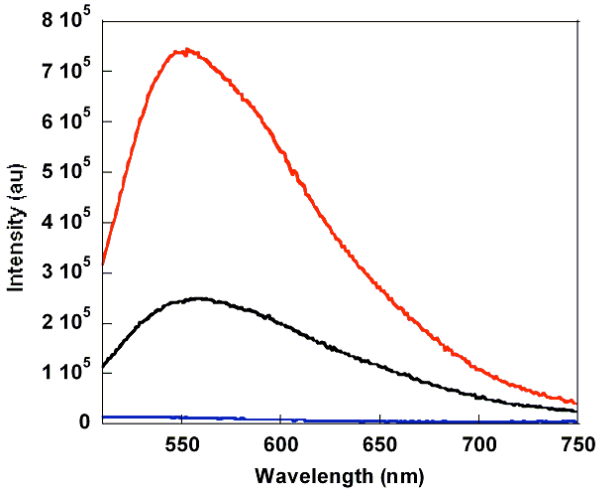

Figure S9: Fluorescence spectra (λ_{ex} = 500 nm) in water: **Li$^+$-MPS-PPV** ([RU] = 1.7 x 10^{-5} M) (black line); **Li$^+$-MPS-PPV** and [**mMV$^+$**] = 2 x 10^{-6} M (blue line); **Li$^+$-MPS-PPV**, **mMV$^+$**, and [BSA] = 3 x 10^{-7} M (red line).

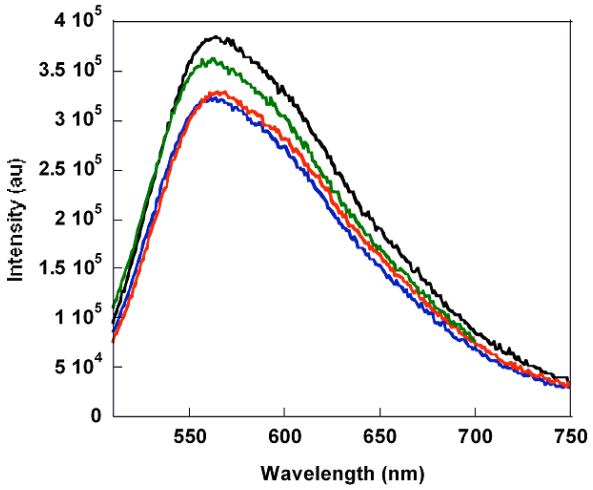

Figure S10: Fluorescence spectra (λ_{ex} = 500 nm) in 0.1M $(NH_4)_2CO_3$: **Li$^+$-MPS-PPV** ([RU] = 1.7 x 10^{-5} M) (black line); **Li$^+$-MPS-PPV** and [**BPP$^+$**] = 2 x 10^{-6} M (blue line); **Li$^+$-MPS-PPV**, **BPP$^+$**, and [pepsin-A] = 3 x 10^{-7} M (red line); **Li$^+$-MPS-PPV** and [pepsin-A] = 3 x 10^{-7} M (green line).

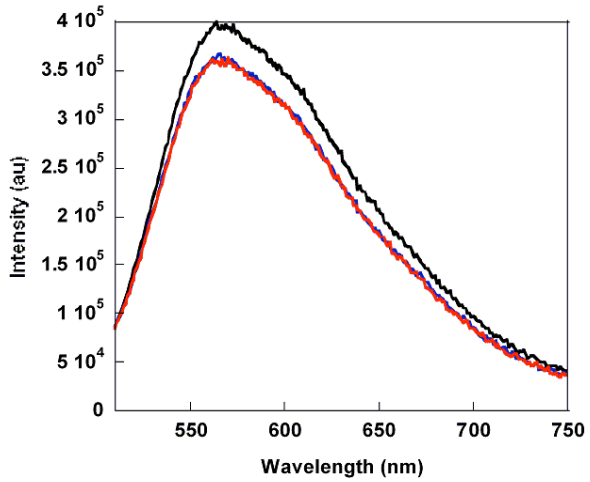

Figure S11: Fluorescence spectra (λ_{ex} = 500 nm) in 0.1M $(NH_4)_2CO_3$: **Li$^+$-MPS-PPV** ([RU] = 1.7 x 10^{-5} M) (black line); **Li$^+$-MPS-PPV** and [**mMV$^+$**] = 2 x 10^{-6} M (blue line); **Li$^+$-MPS-PPV**, **mMV$^+$**, and [pepsin-A] = 3 x 10^{-7} M (red line).

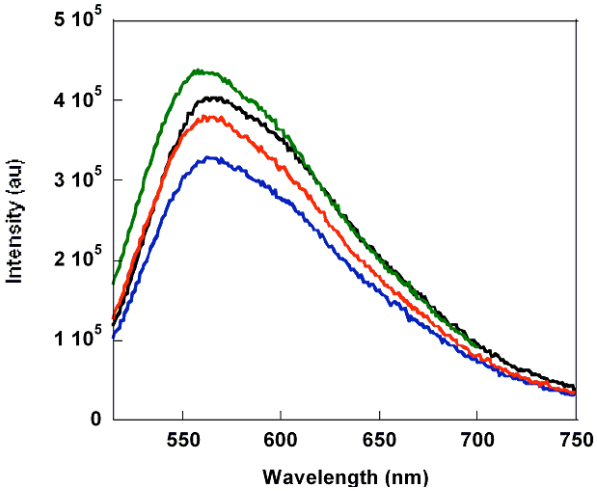

Figure S12: Fluorescence spectra (λ_{ex} = 500 nm) in 0.1M $(NH_4)_2CO_3$: **Li$^+$-MPS-PPV** ([RU] = 1.7 x 10^{-5} M) (black line); **Li$^+$-MPS-PPV** and [**BPP$^+$**] = 2 x 10^{-6} M (blue line); **Li$^+$-MPS-PPV**, **BPP$^+$**, and [BSA] = 3 x 10^{-7} M (red line); **Li$^+$-MPS-PPV** and [BSA] = 3 x 10^{-7} M (green line).

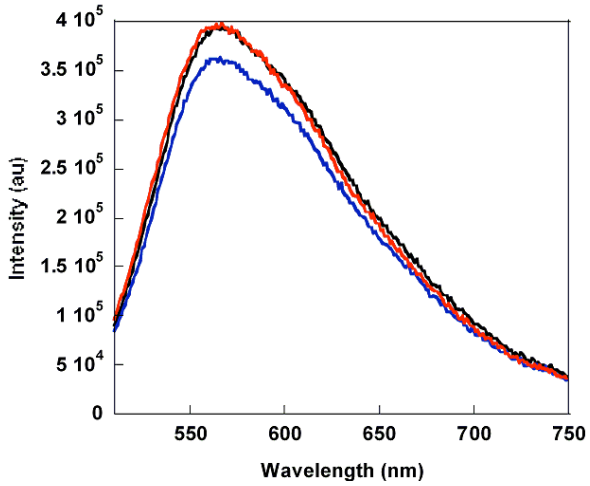

Figure S13: Fluorescence spectra (λ_{ex} = 500 nm) in 0.1M $(NH_4)_2CO_3$: **Li$^+$-MPS-PPV** ([RU] = 1.7 x 10^{-5} M) (black line); **Li$^+$-MPS-PPV** and [**mMV$^+$**] = 2 x 10^{-6} M (blue line); **Li$^+$-MPS-PPV**, **mMV$^+$**, and [BSA] = 3 x 10^{-7} M (red line).

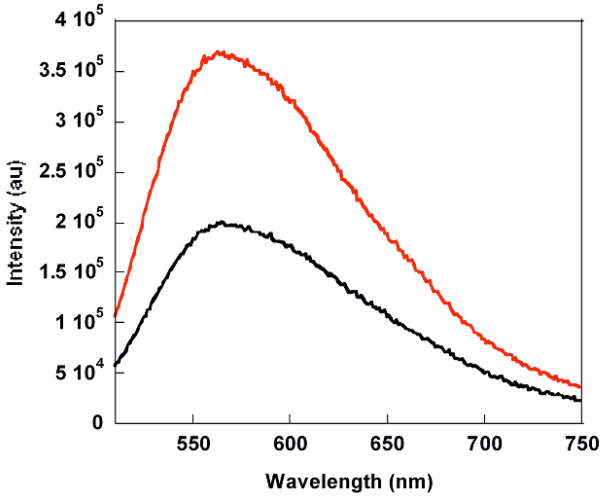

Figure S14: Fluorescence spectra (λ_{ex} = 500 nm) in 0.1 M $(NH_4)_2CO_3$ at pH 8.9: of **Li$^+$-MPS-PPV** ([RU] = 1.7 x 10^{-5} M) (black line); **Li$^+$-MPS-PPV** and [Tau] = 1 x 10^{-7} M (red line).

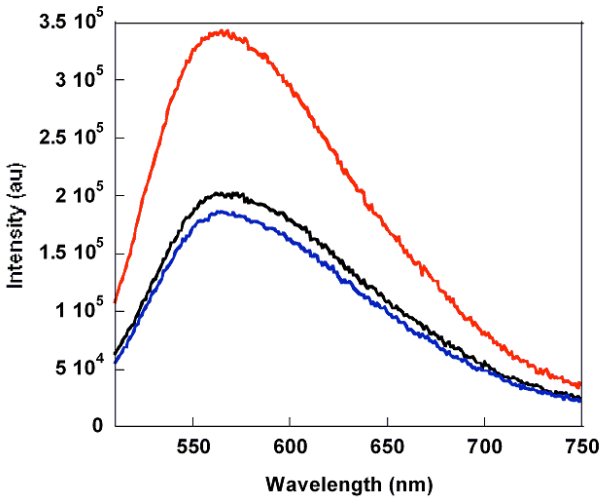

Figure S15: Fluorescence spectra (λ_{ex} = 500 nm) in 0.1 M $(NH_4)_2CO_3$ at pH 8.9: **Li$^+$-MPS-PPV** ([RU] = 1.7 x 10^{-5} M) (black line); **Li$^+$-MPS-PPV** and [**mMV$^+$**] = 2 x 10^{-6} M (blue line); **Li$^+$-MPS-PPV**, **mMV$^+$**, and [Tau] = 1 x 10^{-7} (red line).

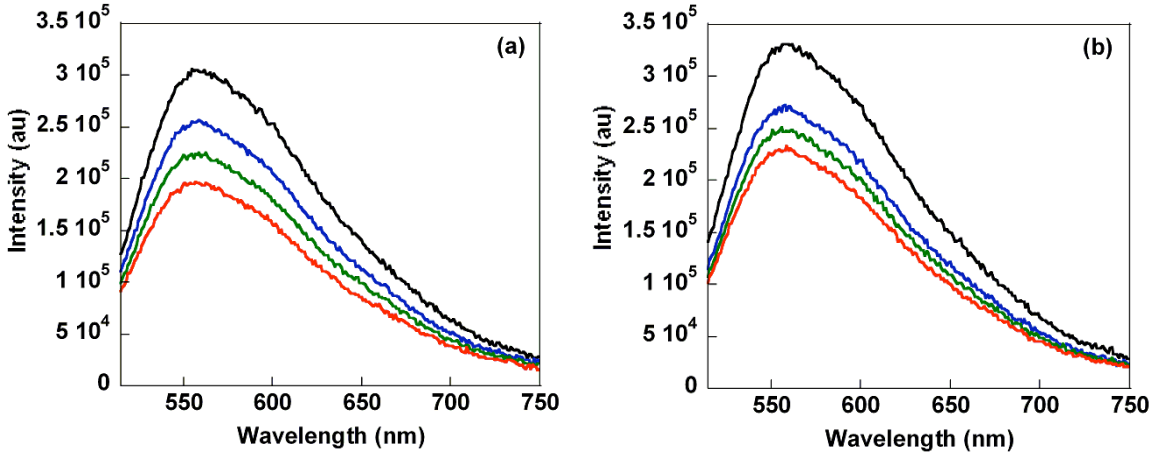

Figure S16: Fluorescence spectra (λ_{ex} = 500 nm) in 0.1 M $(NH_4)_2CO_3$ at pH 8.9: **Li$^+$-MPS-PPV** ([RU] = 1.7 x 10^{-5} M) (black line); **Li$^+$-MPS-PPV** and [**BPP$^+$**] = 2 x 10^{-6} M (blue line); **Li$^+$-MPS-PPV**, **BPP$^+$**, and [avidin] = 1 x 10^{-7} M avidin (green line); **Li$^+$-MPS-PPV**, **BPP$^+$**, and [avidin] = 2 x 10^{-7} M avidin (red line). Figure S16a: Avidin has four vacant biotin binding sites per protein. Figure S16b: Avidin has three vacant biotin binding sites per protein.

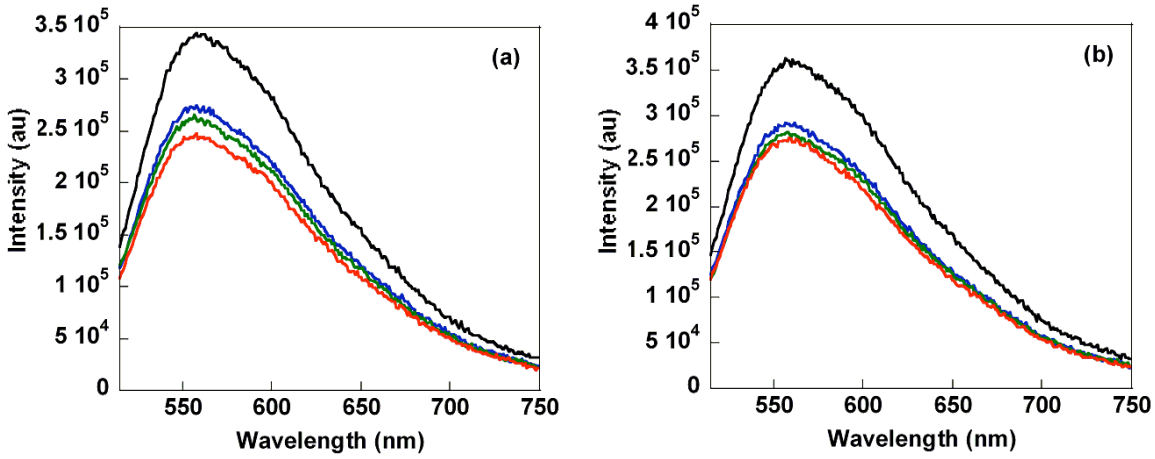

Figure S17: Fluorescence spectra (λ_{ex} = 500 nm) in 0.1 M $(NH_4)_2CO_3$ at pH 8.9: **Li^+-MPS-PPV** ([RU] = 1.7 x 10^{-5} M) (black line); **Li^+-MPS-PPV** and [**BPP^+**] = 2 x 10^{-6} M (blue line); **Li^+-MPS-PPV**, **BPP^+**, and [avidin] = 1 x 10^{-7} M avidin (green line); **Li^+-MPS-PPV**, **BPP^+**, and [avidin] = 2 x 10^{-7} M avidin (red line). Figure S17a: Avidin has two vacant biotin binding sites per protein. Figure S17b: Avidin has one vacant biotin binding site per protein.

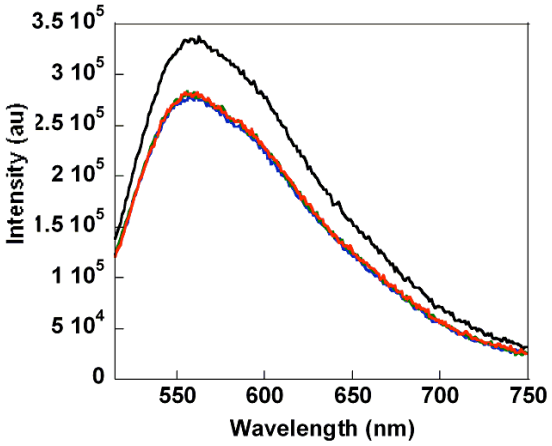

Figure S18: Fluorescence spectra (λ_{ex} = 500 nm) in 0.1 M $(NH_4)_2CO_3$ at pH 8.9: (a) **Li^+-MPS-PPV** ([RU] = 1.7 x 10^{-5} M) (black line); (b) **Li^+-MPS-PPV** and [**BPP^+**] = 2 x 10^{-6} M (blue line); (c) **Li^+-MPS-PPV**, **BPP^+**, and [avidin] = 1 x 10^{-7} M avidin (green line); (d) **Li^+-MPS-PPV**, **BPP^+**, and [avidin] = 2 x 10^{-7} M avidin (red line). Avidin used has no vacant biotin binding sites.

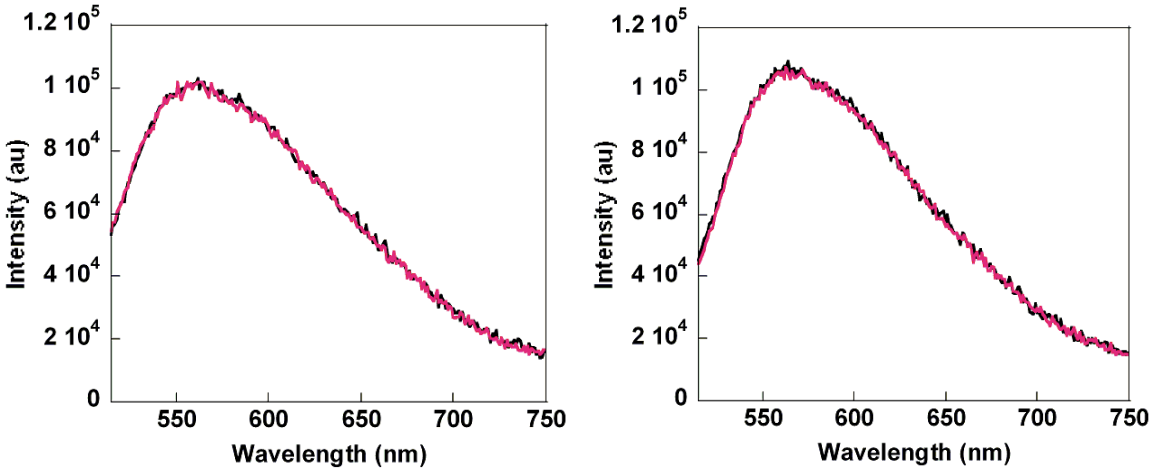

Figure S19: Fluorescence spectra (λ_{ex} = 500 nm) in water (left chart) and 0.1 M $(NH_4)_2CO_3$ at pH 8.9 (right chart): **Li^+-MPS-PPV** ([RU] = 1.7 x 10^{-5} M) (black line); **Li^+-MPS-PPV** ([RU] = 1.7 x 10^{-5} M) (red line) after 15 consecutive scans. Samples were mixed for 4-5 seconds between each scan. Similar results were obtained for **Na^+-MPS-PPV** in water and $(NH_4)_2CO_3$ buffer.