Efficient Blue Emitting Silafluorene-fluorene Conjugated Copolymers: Selective Turn-off/Turn-on Detection of Explosives

*Jason C. Sanchez and William C. Trogler**

Department of Chemistry and Biochemistry, University of California at San Diego, 9500 Gilman Drive, La Jolla, California 92093-0358

Supporting Information

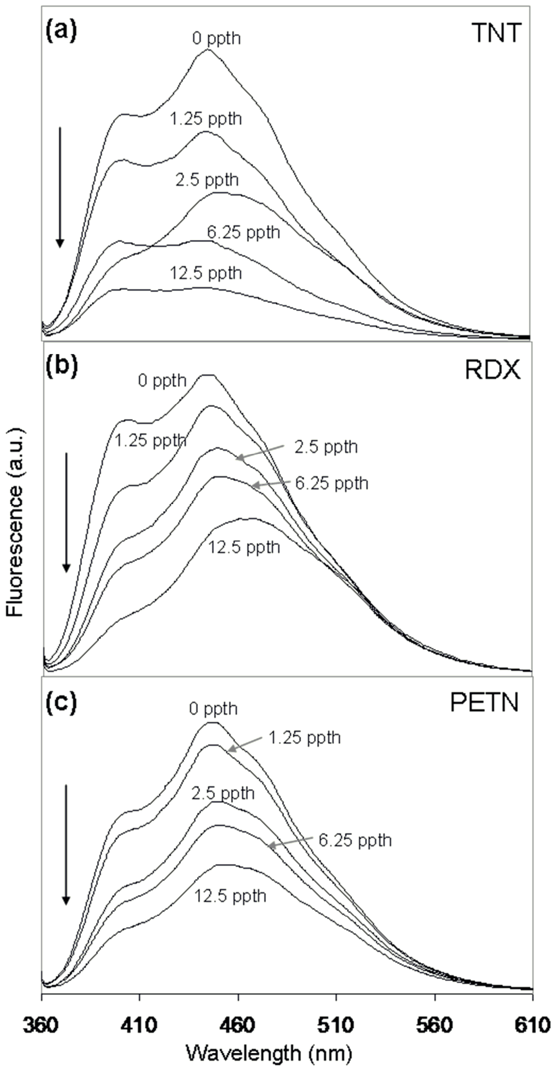

Fig. S1 Solid-state fluorescence quenching behavior of **PSF2** on silica TLC plates in the presence of (a) TNT, (b) RDX, (c) PETN. The concentration of explosive is reported in ppth of explosive-to-polymer (ppth = parts per thousand by weight).

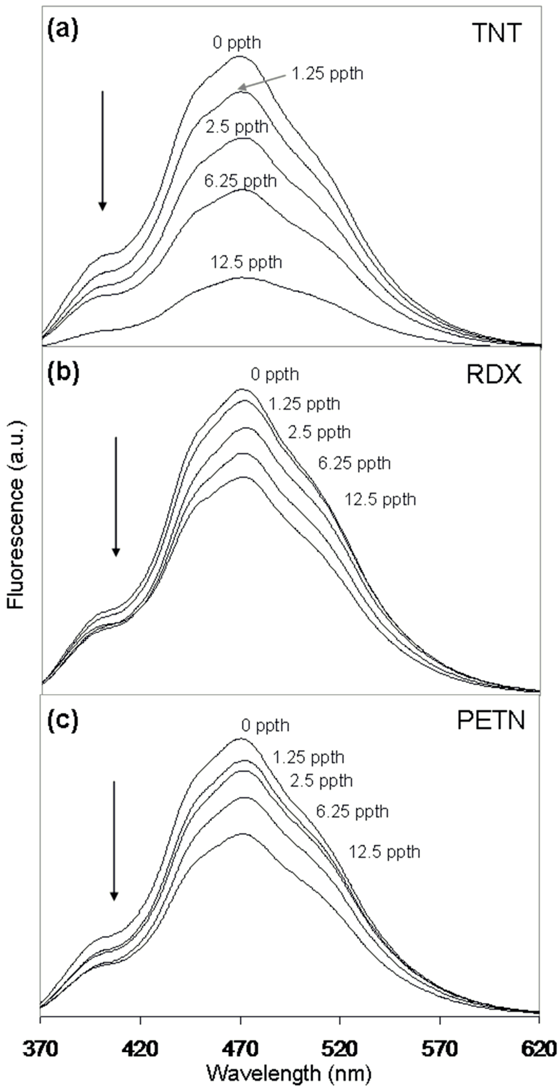

Fig. S2 Solid-state fluorescence quenching behavior of **PSF3** on silica TLC plates in the presence of (a) TNT, (b) RDX, (c) PETN. The concentration of explosive is reported in ppth of explosive-to-polymer (ppth = parts per thousand by weight).

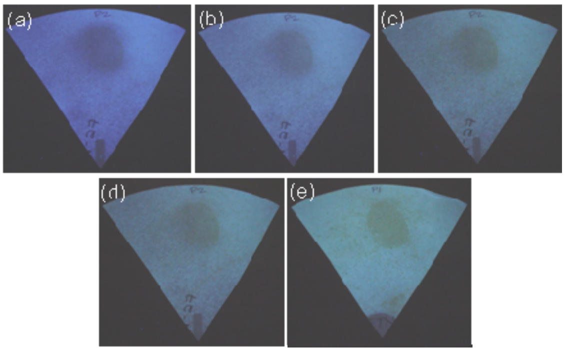

Fig. S3 Example of the time-dependent turn-off/turn-on selective detection of production line PETN by **PSF1**. (a) Initial detection of PETN by fluorescence quenching at 1 s UV light (302 nm) exposure. (b) Fading of the polymer photoluminescence at 10 s UV light exposure. (c) Onset of the green-yellow turn-on luminescence of the thumbprint at 20 s UV light. (d) Further confirmation of turn-on emission at 30 s UV light. (e) Final stage of luminescence before the onset of photo-degradation at 1 min UV light.

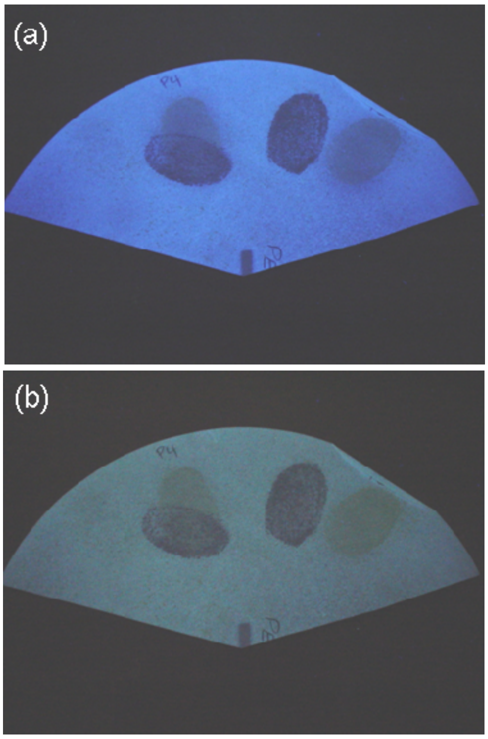

Fig. S4 Example of detection selectivity for TNT and PETN by **PSF1**. Thumbprints of each explosive were laid down side-by-side and overlapping to emphasize the selective detection process. (a) Initial fluorescence quenching detection of thumbprints of both TNT (dark prints) and PETN (lighter prints). (b) Same thumbprints after exposure to 1 min of UV light (302 nm). The background luminescence has faded to a dull green color. The TNT thumbprints remain dark, quenched spots. The PETN thumbprints now show a green-yellow luminescence providing selectivity for the presence of a nitrate ester explosive.

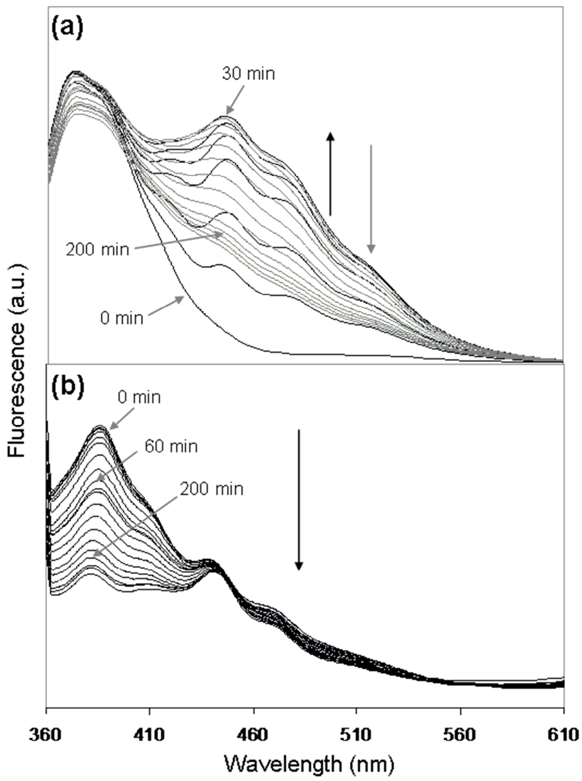

Fig. S5 Time-dependent solution phase fluorescence quenching plots of (a) **1** and (b) **2** (10 ppb in degassed, anhydrous benzene) upon exposure to UV light (302 nm). Spectra taken every 10 min of UV light exposure over 280 min time frame. Benzene solutions behave similar to toluene, suggesting that the solvent is not responsible for the appearance of the peak at 432 nm. The peak at 432 nm is not observed for dimer **2**, giving further evidence for the dimerization of the fluorene unit for dimer **1**.

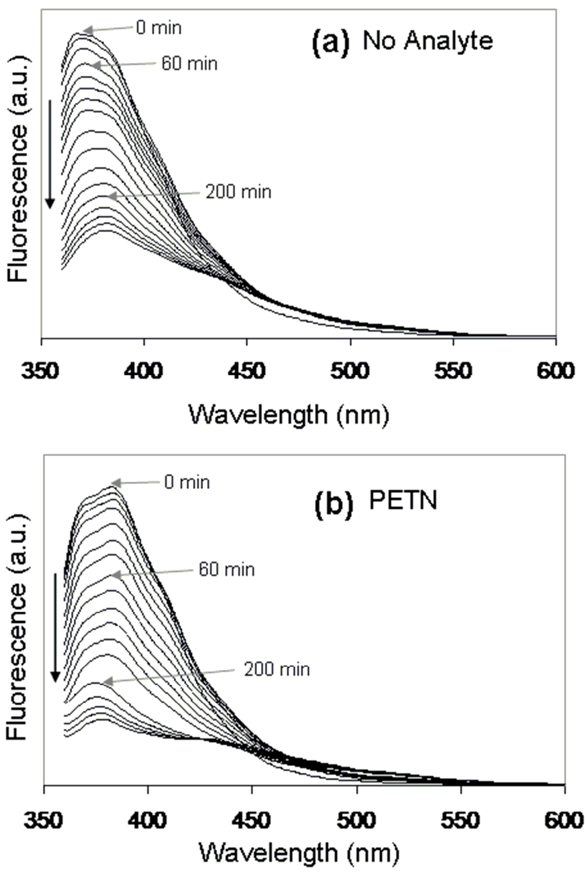

Fig. S6 Time-dependent solution phase fluorescence quenching plots of **1** (10 ppb in degassed toluene) upon exposure to UV light in the presence of (a) no analyte and (b) PETN. Analytes added at a concentration of 50 ppm. Spectra were taken every 10 min of UV light exposure over 280 min time frame. The oxygen-free environment prevents the onset of oxidation to the polymer (370 nm) and prevents oxidation of the fluorene unit to fluorenone in the presence of PETN (523 nm). The presence of trace quantities of water prevents the onset of dimerization between fluorene units (appearance of the 432 nm).