Supplementary Material (ESI) for Polymer Chemistry

Electronic Supplementary Information

Superamplification effect in the detection of explosives by a fluorescent hyperbranched poly(silylenephenylene) with aggregation-enhanced emission characteristics

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Experimental section

The hyperbranched poly(silylenephenylene) (*hb*-PSP) used in this work was synthesized according to our previously published procedures.[1] Its weight-average molecular weight and polydispersity index estimated by GPC based on a calibration with linear polystyrenes are 13800 and 2.6. THF was distilled from sodium benzophenone ketyl immediately prior to use. Particle sizes of the polymer aggregates in THF/water mixtures were measured on a BeCoulter Delsa 440SX Zeta potential analyzer. Absorption spectra were measured on a Milton Ray Spectronic 3000 array spectrophotometer. PL spectra were recorded on a Perkin-Elmer LS 55 spectrofluorometer. PL efficiency of the polymer film was measured with an integrating sphere.

A femtosecond titanium-sapphire oscillator was used as the excitation source. A UV beam with a wavelength of 267 nm (third harmonic of the laser output at 800 nm) was used as the pumping source in

the experiments. Pulse width and repetition rate of the laser were 200 fs and 76 MHz, respectively. Excitation power was about 0.3 mW. Time-resolved PL spectra were measured by using a Hamamatsu model C4334 streak camera coupled to a spectrometer. The time resolution was 20 ps. The PL signals were measured at the emission peak of 380 nm. Decay in the PL intensity (I) with time (t) was fitted by a double-exponential function:

$$I = A_1 e^{-t/\tau_1} + A_2 e^{-t/\tau_2} \quad (1)$$

where τ_1 and τ_2 are the lifetimes of the shorter- and longer-lived species, respectively, and A_1 and A_2 are their respective amplitudes. The weighted mean lifetime <τ> was calculated according to equation 2:

$$\langle \tau \rangle = \frac{A_1\tau_1 + A_2\tau_2}{A_1 + A_2} \quad (2)$$

Reference

1 J. Z. Liu, R. H. Zheng, Y. H. Tang, M. Haussler, J. W. Y. Lam, A. Qin, M. X. Ye, Y. N. Hong, P. Gao and B. Z. Tang, *Macromolecules*, 2007, **40**, 7473.

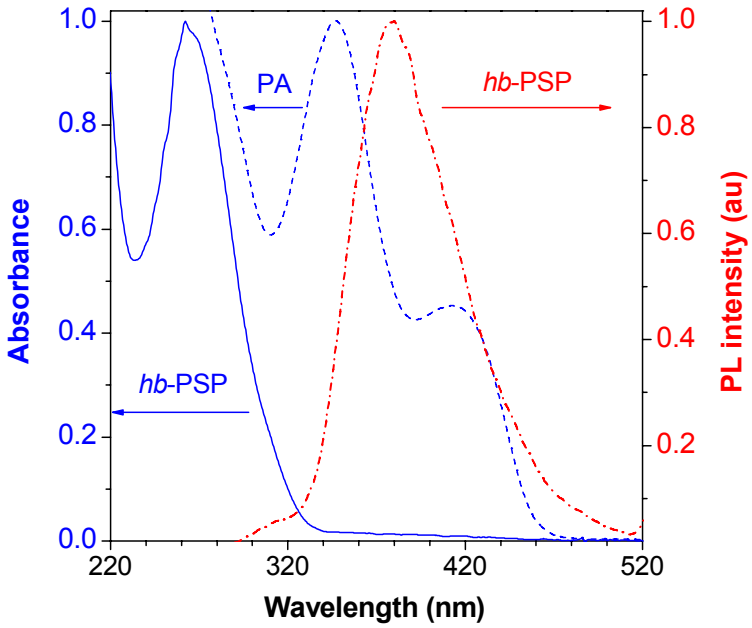

Fig. S1 Normalized absorption spectra of PA and *hb*-PSP and PL spectrum of *hb*-PSP in THF solutions. Concentration of *hb*-PSP: 3.5×10^{-5} M; concentration of PA: 2.2×10^{-5} M.

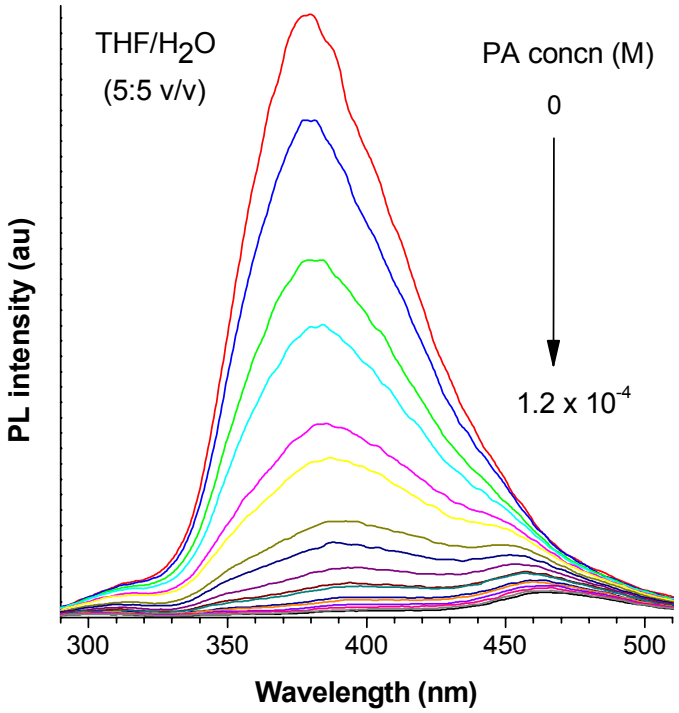

Fig. S2 PL spectra of *hb*-PSP in THF/water mixture (5:5 v/v) in the presence of different amounts of PA; *hb*-PSP concentration: 3.5×10^{-5} M.

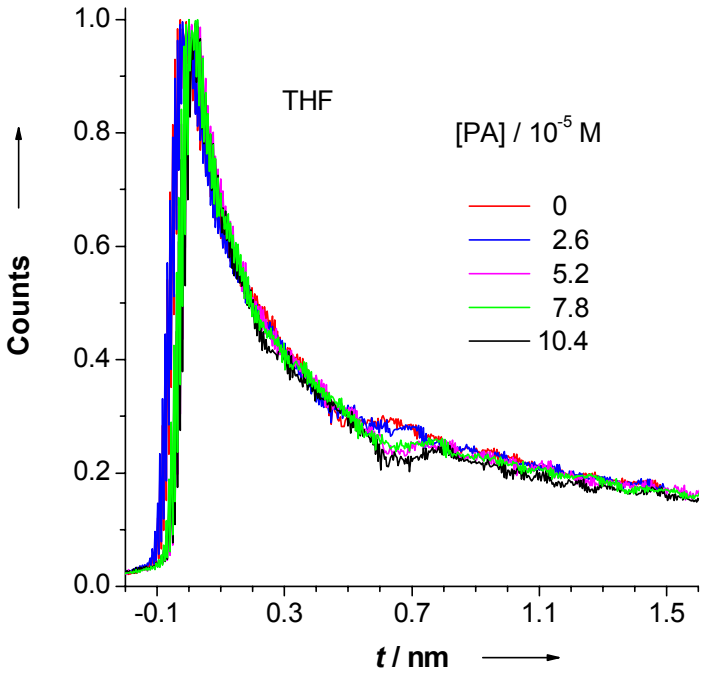

Fig. S3 Fluorescence decay curves of *hb*-PSP at 380 nm in THF in the presence of different amount of PA. Excitation wavelength: 267 nm; *hb*-PSP concentration: 3.5×10^{-5} M.