

Electronic Supplementary information

**Pyrene-based monomer-excimer dual response organosilicon polymer  
for selective detection of 2,4,6-trinitrotoluene (TNT) and 2,4,6-  
trinitrophenol (TNP)**

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## Experimental section

### Materials and measurements

All chemicals were purchased from J&K Scientific Ltd and directly used without any treatment. NMR ( $^1\text{H}$ ) spectra were obtained on a Bruker AVANCE 400 MHz spectrometer using  $\text{CDCl}_3$  as a solvent. Fluorescent emission spectra were recorded by a Hitachi F 4600 spectrometer.

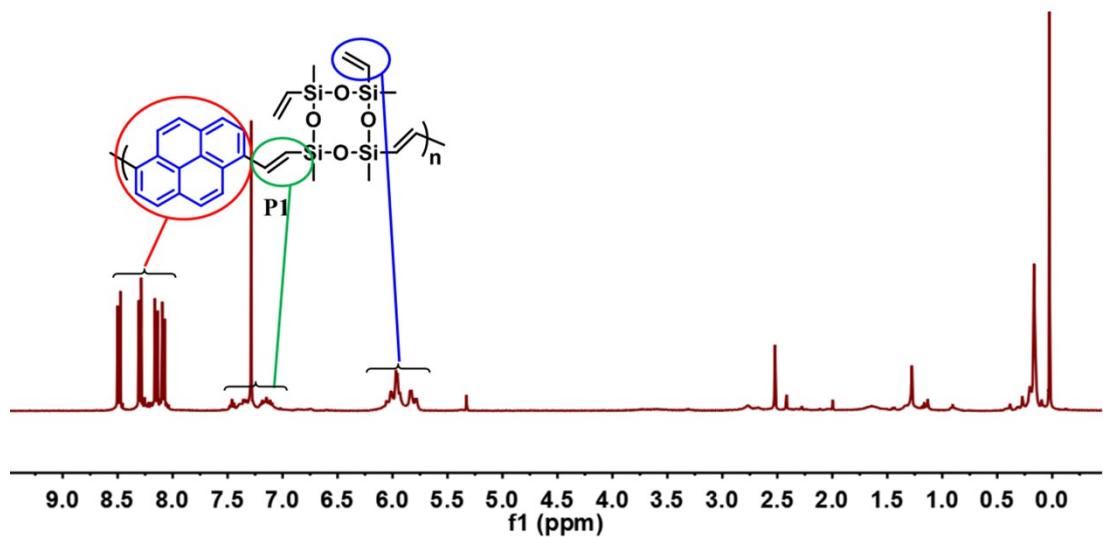
### Synthesis of pyrene-based polymers

Pyrene based polymers (**P1-P3**) were synthesized following the same synthetic procedure. Take **P1** for example, 1,6-dibromopyrene (720 mg, 2 mmol), 2,4,6,8-Tetravinyl-2,4,6,8-tetramethylcyclotetra-siloxane ( $\text{D}_4^{\text{vi}}$ , 345 mg, 2 mmol), palladium acetate (30 mg) and triphenylphosphine (60 mg) were dissolved in toluene (30 mL) in an oven-dried flask (100 mL), respectively. Then, triethylamine (5 mL) was added, and the mixture refluxed for 48 h under  $\text{N}_2$  atmosphere. After cooling to room temperature, the mixture was filtered to remove insoluble catalyst and filter liquor was evaporated under reduced pressure. The crude product was dissolved in THF and then was dumped into methanol. The yellow viscous liquid (**P1**) was obtained after dried. **P2** and **P3** were synthesized with the siloxane to 1,6-dibromopyrene molar ratios of 1:2 and 1:3, respectively. Yield: **P1** (yellow viscous liquid, 86.3 %), **P2** (yellow powder, 84.6 %) and **P3** (yellow solid, 81.5 %).

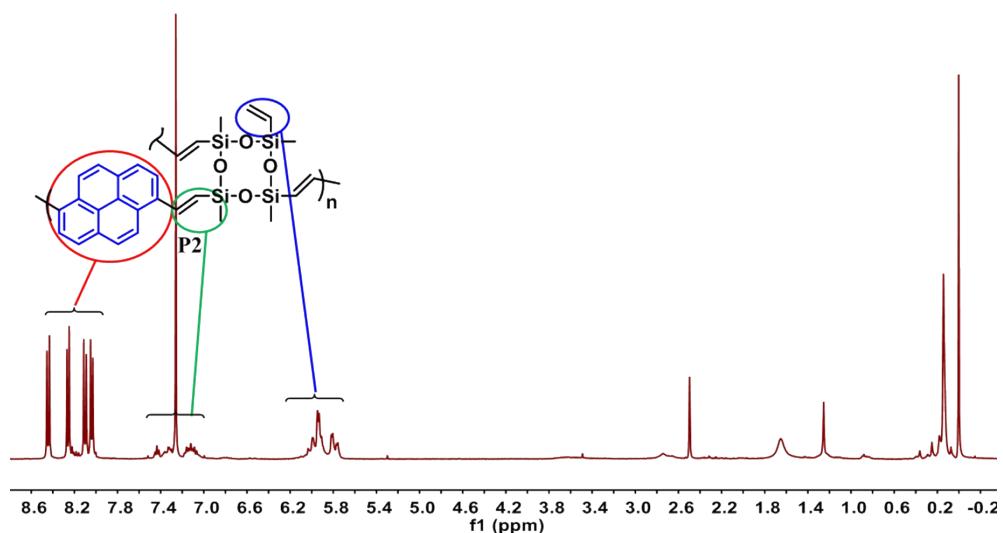
### Fluorescence property and analyte detection

Fluorescent emission spectra of pyrene-based polymers (**P1-P3**) in THF and water-ethanol solution (0.02 mg/mL), respectively ( $\lambda_{\text{ex}} = 350$  nm).

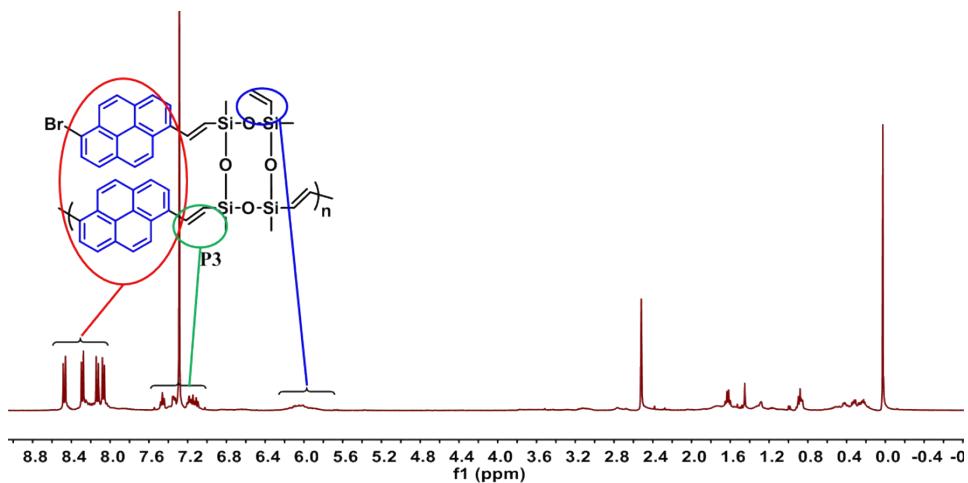
2,4,6-trinitrotoluene (TNT) and 2,4,6-trinitrophenyl (TNP) were detected by adding corresponding analytes (0.2 mg/mL) to **P1** solution (0.02 mg/mL, water-to-ethanol ratio at 55:45 v/v) ( $\lambda_{\text{ex}} = 350$  nm).



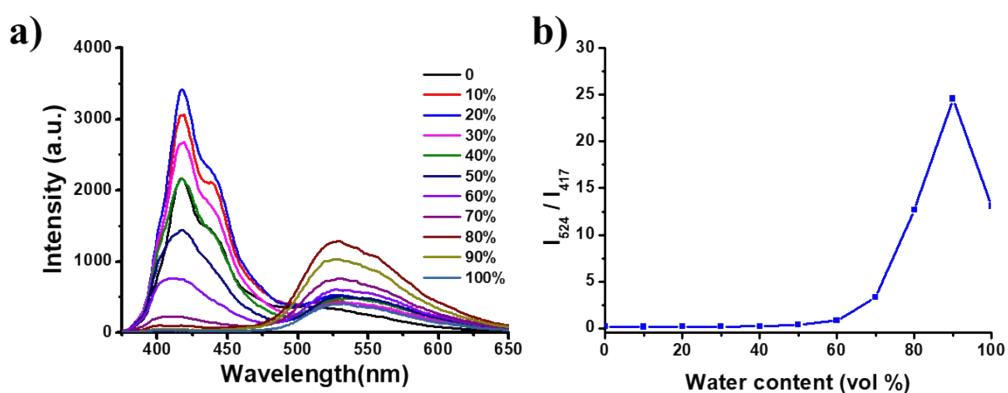
**Fig. S1**  $^1\text{H}$  NMR spectrum of **P1** in  $\text{CDCl}_3$ .



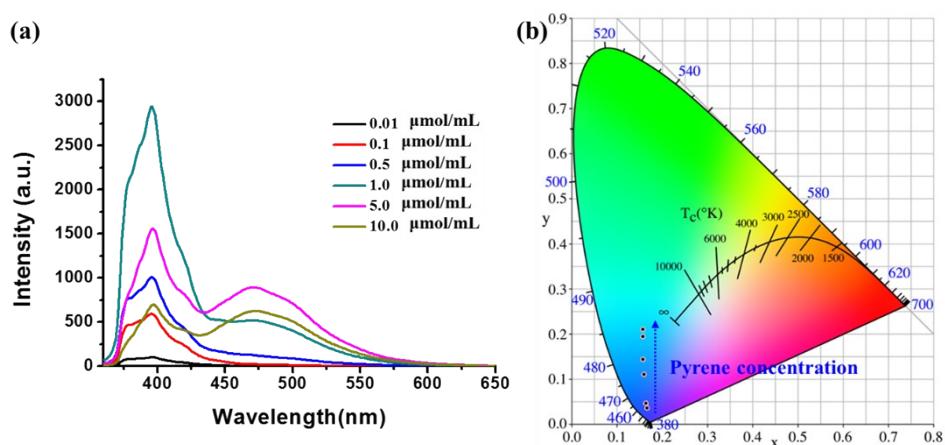
**Fig. S2**  $^1\text{H}$  NMR spectrum of **P2** in  $\text{CDCl}_3$ .



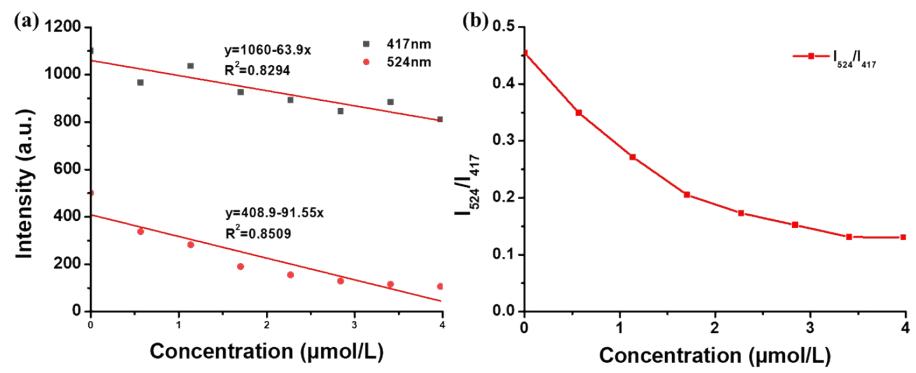
**Fig. S3**  $^1\text{H}$  NMR spectrum of **P3** in  $\text{CDCl}_3$ .



**Fig. S4** (a) Fluorescence spectra and (b) fluorescence intensity ratio ( $I_{524}/I_{417}$ ) of **P1** in  $\text{EtOH-H}_2\text{O}$  solution with increasing of water content. ( $\lambda_{\text{ex}} = 350 \text{ nm}$ )



**Fig. S5** (a) Fluorescence spectra and (b) CIE parameters of pyrene at different concentrations in  $\text{EtOH-H}_2\text{O}$  solution (volume ratio = 45:55). ( $\lambda_{\text{ex}} = 350 \text{ nm}$ )



**Fig. S6** (a) Fluorescence intensity of **P1** (0.02 mg/mL) at 417 nm and 524 nm and their intensity ratio ( $I_{524}/I_{417}$ ) by adding successive concentrations of TNT in EtOH-H<sub>2</sub>O (volume ratio = 45:55) solution. ( $\lambda_{\text{ex}} = 350$  nm)