

Electronic Supplementary Information

Supersensitive detection of explosives by recyclable AIE luminogen-functionalized mesoporous materials

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Starting materials

3-Aminopropyltriethoxysilane (APTS, Sigma-Aldrich), Tetraethoxysilane (TEOS, Beijing Beihua Chemical Co., Ltd.), Picric acid (PA, Xilong Chemical Co., Ltd.), Tetrahydrofuran (THF, Tianjin Tiantai Fine Chemical Co., Ltd.). All the initial chemicals in this work were used without further purification.

Synthesis of TPE modified SBA-15 (SNF)

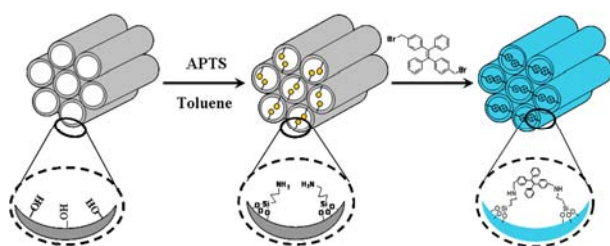
10, 40 and 60 mg of BTPE were added into the mixture of 200 mg of SN and 20 mL of THF solution, respectively, and the mixture was stirred at room temperature for 24 h, then the white solid was filtered off, the product was transferred into the Soxhlet extractor, washed with THF for 48 h. The as-prepared materials are named as SNF-1, -2 and -3. SNF-4 was prepared in the mixture of 50 mg BTPE, 200 mg SN and 20 mL DMSO at 80 °C for 24 h under stirring.

Physical measurements

Powder X-ray diffraction (XRD) patterns were recorded on a Rigaku Ultima IV X-ray diffractometer with CuK α radiation. N₂ adsorption-desorption isotherms were measured on a Micromeritics Gemini V at 77 K. Transmission-electron-microscopy (TEM) images were recorded with a Tecnai F20 electron microscope. UV-Vis adsorption spectra were obtained on a Shimadzu UV-2550 spectrophotometer. The UV/Vis excitation and emission spectra were obtained on a Shimadzu RF-5301PC spectrofluorometer. CHN elemental analyses were performed on a varioMICRO elemental analyzer.

Table S1. Textural parameters of SN and SNFs.

| Sample | $S_{\text{BET}}(\text{m}^2/\text{g})$ | $D_{\text{BJH}}(\text{nm})$ | $V(\text{cm}^3/\text{g})$ | TPE loading (mmol/g) |
|--------|---------------------------------------|-----------------------------|---------------------------|----------------------|
| SN | 231 | 5.76 | 0.35 | - |
| SNF-1 | 225 | 5.75 | 0.32 | 0.031 |
| SNF-2 | 217 | 5.45 | 0.29 | 0.042 |
| SNF-3 | 207 | 5.15 | 0.27 | 0.067 |
| SNF-4 | 155 | 5.10 | 0.25 | 0.110 |



Scheme S1. The synthesis route to prepare TPE functionalized SBA-15

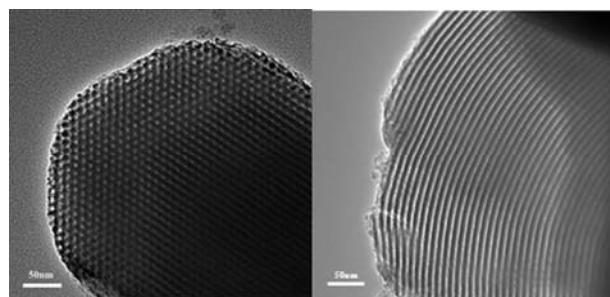


Figure S1. TEM images of SNF-3

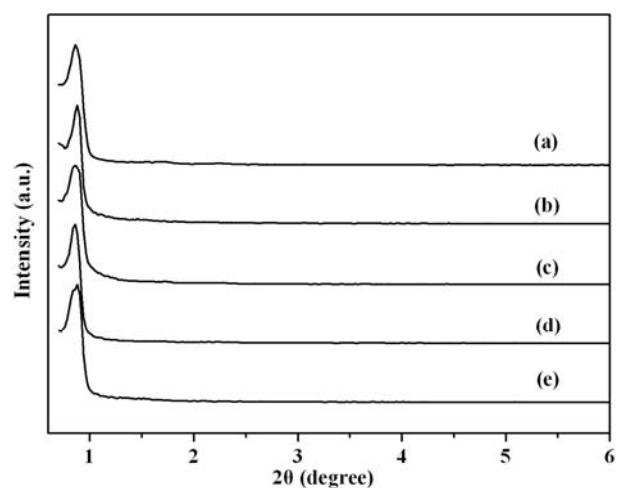


Figure S2. XRD patterns of (a) SN; (b) SNF-1; (c) SNF-2; (d) SNF-3; (e) SNF-4.

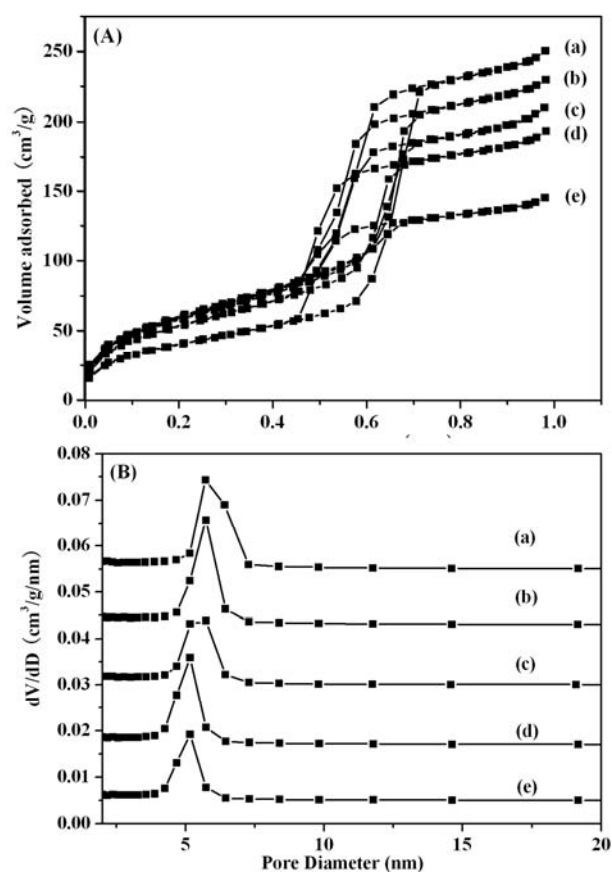


Figure S3. (A) N₂ adsorption-desorption isotherms of (a) SN; (b) SNF-1; (c) SNF-2; (d) SNF-3; (e) SNF-4 and (B) corresponding pore size distributions based on the adsorption branch of the isotherm with the Barrett-Joyner-Halenda (BJH) method.

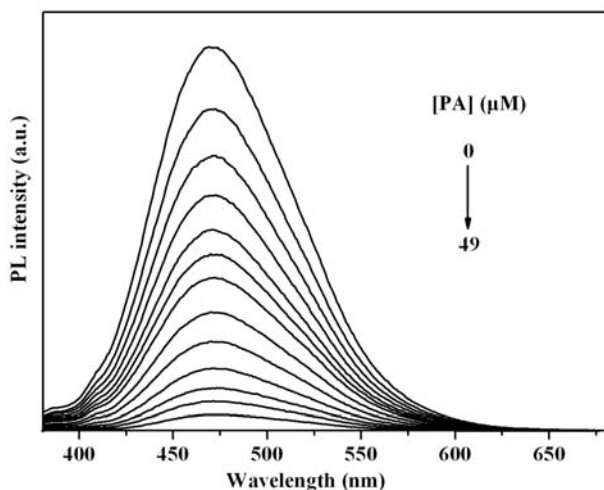


Figure S4. Fluorescence emission spectra of the SNF-1 with the addition of different amounts of PA in the water solution. SNF-1 concentration: 1 mg mL^{-1} ; excitation wavelength: 360 nm.

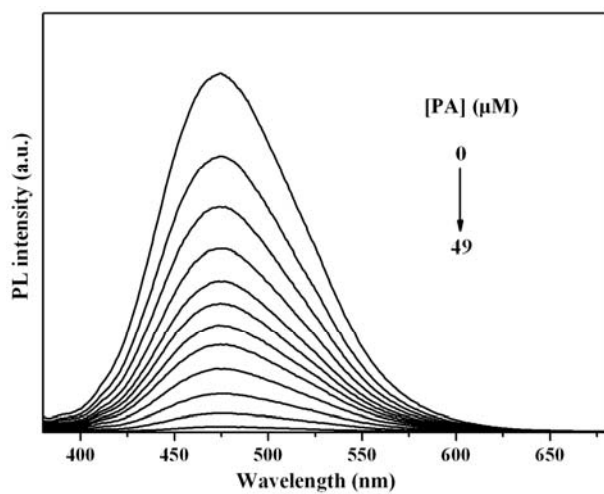


Figure S5. Fluorescence emission spectra of the SNF-2 with the addition of different amounts of PA in the water solution. SNF-2 concentration: 1 mg mL^{-1} ; excitation wavelength: 360 nm.

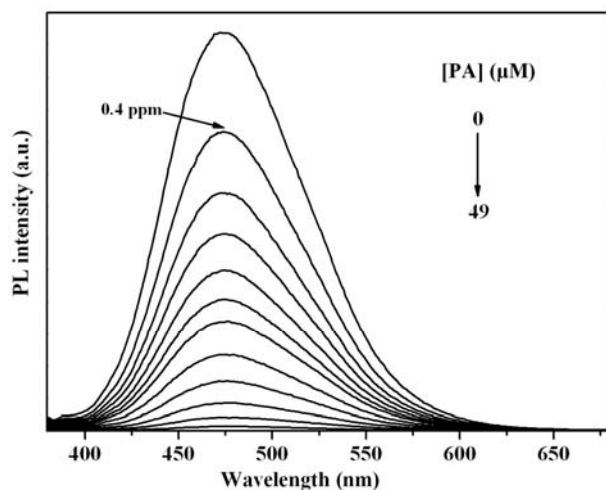


Figure S6. Fluorescence emission spectra of the SNF-3 with the addition of different amounts of PA in the water solution. SNF-3 concentration: 1 mg mL^{-1} ; excitation wavelength: 360 nm.

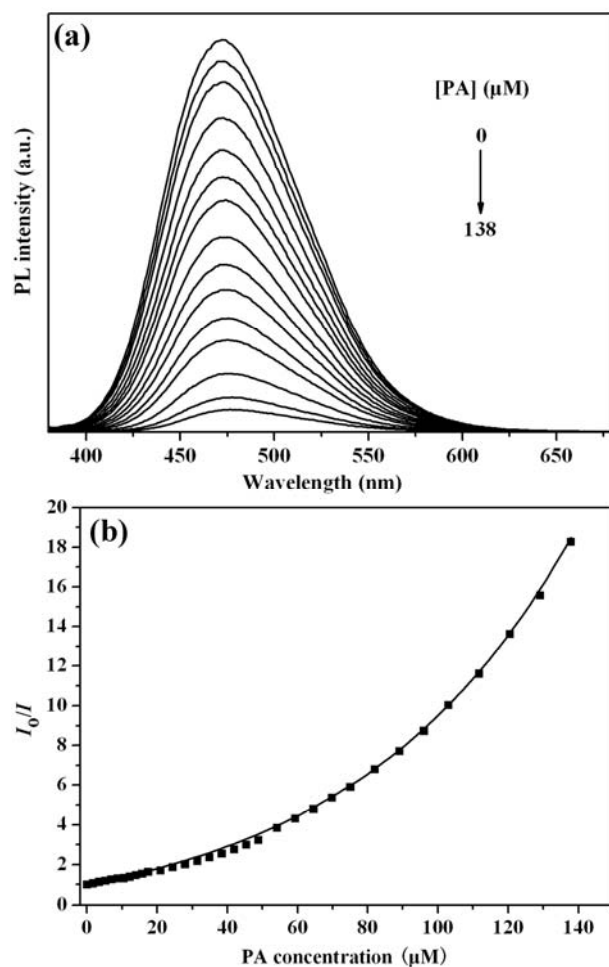


Figure S7. (a) Fluorescence emission spectra of the TPE (4.8×10^{-5} M) with the addition of different amounts of PA in THF-water (1: 9 v/v) solution. (b) Stern-Volmer plot of I_0/I versus [PA] fitted to the exponential equation of $I_0/I = 2.1e^{16191[PA]} - 1.1$. Excitation wavelength: 360 nm.

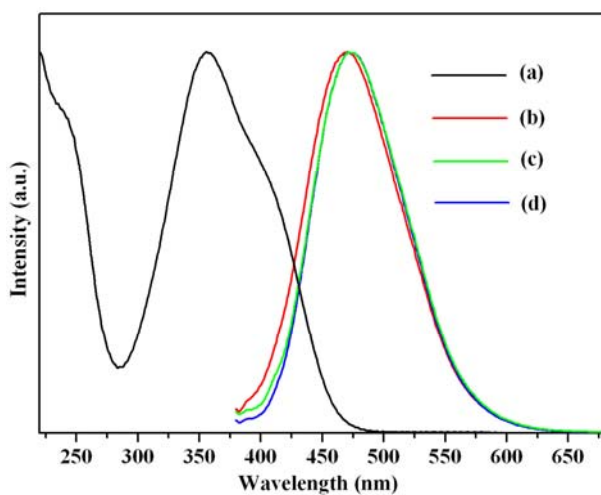


Figure S8. (a) Absorption spectrum of PA; the PL spectra of (b) SNF-1, (c) SNF-2, and (d) SNF-3 in water.