Supporting Information

Experimental section

Materials and methods

PAN (M_w=80,000) was purchased from Nanjing Stable Co., Ltd. (Nanjing, China). γ-aminobutyric acid (GABA), $Eu(NO_3)_3 \cdot 6H_2O$ and Trimesic acid (H_3BTC) were obtained from Aladdin Reagent Co., Ltd. (Shanghai, China). N, N-Dimethylformamide (DMF), glycerol, nitrobenzene (NB), chlorobenzene, benzene, toluene, p-xylene, pheno, naphthalene and bromobenzene were supplied by Sinopharm Chemical Reagent Co., Ltd. (Beijing, China). All chemicals were of analytical grade and used as received without further refinement.

Morphologies of the prepared membranes were examined with scanning electron microscopy (SEM) measurements (Hitachi SU8010, Japan). The chemical structures of relevant samples were examined by employing a Fourier transform infrared (FT-IR) spectrometer (BRUKER-VETERX70, Germany). Powder X-ray diffraction (XRD) was acquired with a diffractometer with monochromated Cu Kα radiation (Bruker AXS D8, Germany). The simulated XRD pattern was generated by Mercury software from the single-crystal data of $Eu(BTC)(H_2O) \cdot DMF$ (CCDC 604441). Porosity and pore size distribution of the membranes were determined by a mercury porosimeter (AutoPore IV 9500, USA). The water contact angle was characterized by a Harke-SPCA contact angle measuring device (SPCA-1, China). Photoluminescence experimental data were recorded using a PerkinElmer LS55 fluorescence spectrophotometer (Perkin-Elmer, UK). The sampling was cut into disk with a diameter of 10 mm.

Preparation of PAN NFM

The electrospinning solution was prepared by dissolving 1.3 g PAN in 10 mL DMF with vigorous stirring at 50 °C. After PAN completely dissolved, the as-prepared solution was cooled and transferred to a 5 mL glass syringe with metal needle tip (0.5 mm diameter). During the electrospinning process, the PAN solution was pumped out at a fixed speed of 0.6 mL h^{-1}. The applied working voltage was 18 kV, and the collection distance between the needle tip to aluminum foil was 14 cm. The temperature and relative humidity were sustained at 30 ± 2 °C and 50 ± 5%, respectively. The obtained PAN NFM was washed with deionized water and dried under vacuum for functionalization.

Modification of PAN NFM with GABA

The modification solutions with different mass ratio of PAN NFM and GABA (1:1, 1:2, 1:4, 1:6 and 1:8) were prepared via dissolving certain amount of GABA in 100 mL glycerol under stirring at 60 °C, and 200 wt % NaOH (as to the mass of PAN NFM) was synchronously added into the solution. Then the as-prepared PAN NFMs were immersed in above solutions at 130°C for 10 h under nitrogen. The obtained PAN-GABA NFMs were neutralized with HCl, washed with deionized water and dried at atmospheric temperature.

In situ growth of Eu-MOF crystals on PAN-GABA NFM

Eu-MOF ($Eu(BTC)(H_2O) \cdot DMF$) nanocrystals were synthesized according to the reported literature.[1] The in situ growth of Eu-MOF on the PAN-GABA NFM skeleton was performed as follows. Typically, $Eu(NO_3)_3 \cdot 6H_2O$ (50 mg) and H_3BTC (20 mg) were dissolved in mixture solvent of H_2O (2 mL) and DMF (10 mL) in a sealed beaker with vigorous stirring at room temperature.

And then 24.6 mg of sodium acetate was added into the solution as capping reagent to control the size of Eu-MOF crystals. Following, the as-prepared PAN-GABA NFM was immersed in the above solution, and the sealed beaker was heated at 60 °C. Finally, the PAN-GABA@Eu-MOF NFMs with different growing time were obtained and washed several times with DMF and ethanol.

Fluorescence measurements

Selective detection of NB by means of fluorescence spectroscopy was performed as the following procedure. The PAN-GABA@Eu-MOF NFM was cut into disk with a diameter of 10 mm, and then different aromatic compounds were dripped onto the NFM. During the fluorescence measurements, the samples were excited at 234 nm and the width of the excitation and emission slit was both 10 nm. To study the detection limit of the NFM for NB, a similar procedure was carried out.

Reversibility studies

To evaluate the reversibility of PAN-GABA@Eu-MOF NFM, The “off-on” fluorescence switching process was repeated consecutively 10 times. After each luminescence quenching by NB, the NFM was washed with methanol and dried quickly for using in the succeeding cycle.

Supplementary characterization and spectra

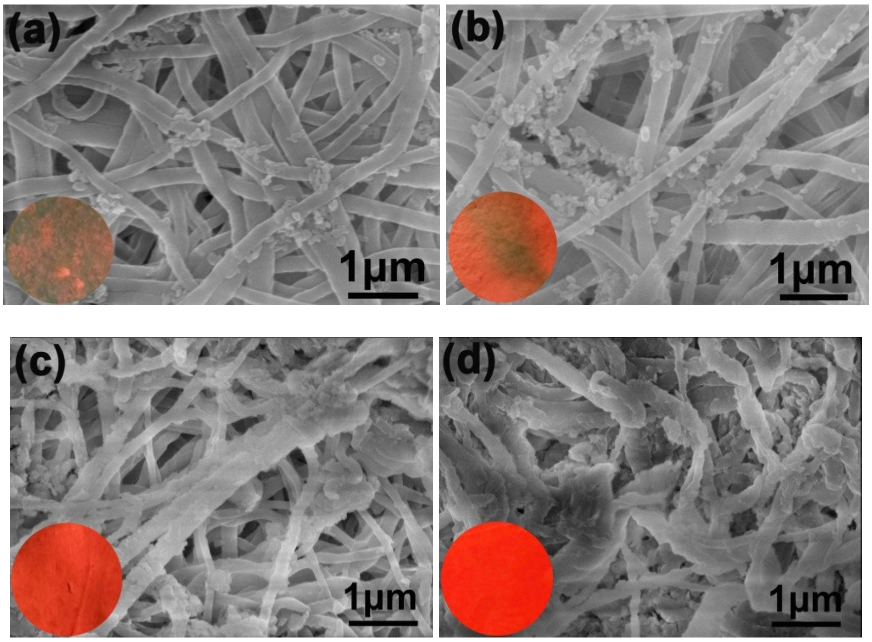


Fig. S1 SEM images of PAN-GABA@Eu-MOF nanofibers with different MOF crystal growth time: (a) 3 h, (b) 6 h, (c) 12 h and (d) 24 h. Insets are the corresponding photographs of NFMs under a 265 nm UV lamp.

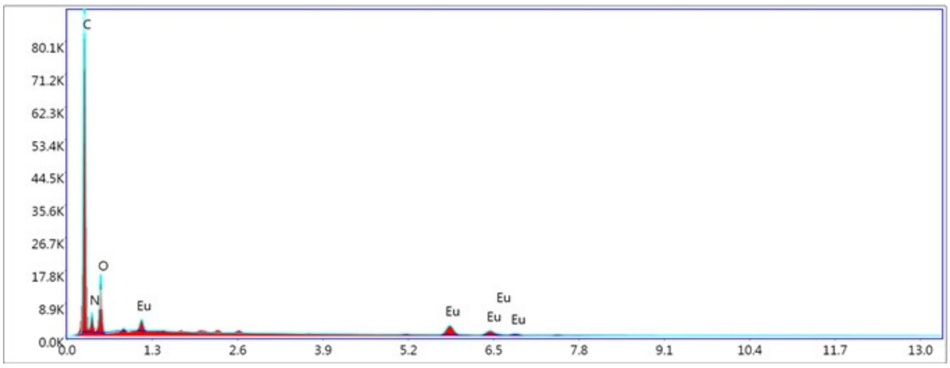


Fig. S2 EDS spectrum of PAN-GABA@Eu-MOF NFM

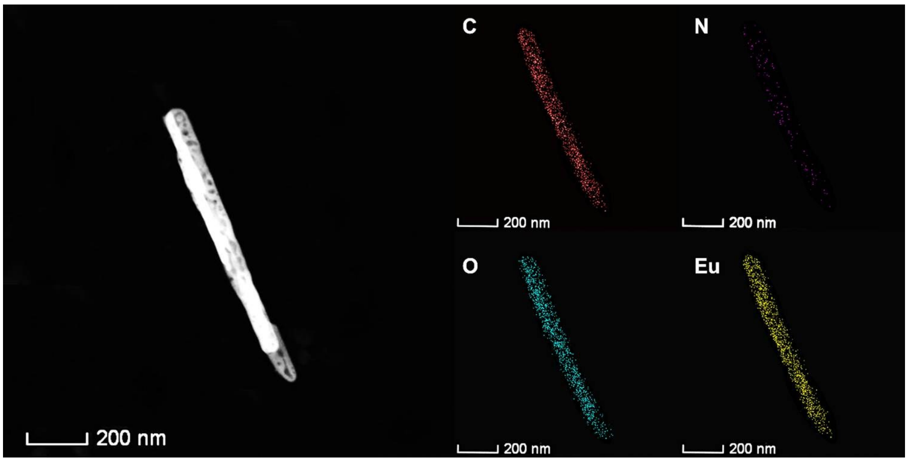


Fig. S3 HAADF-STEM image and elemental mapping of PAN-GABA@Eu-MOF nanofiber

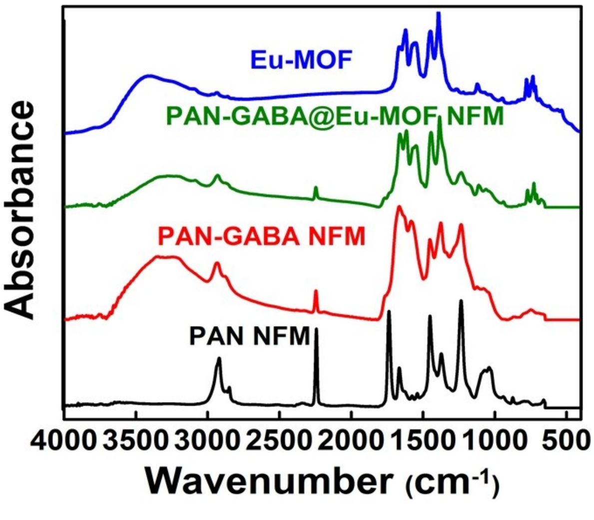


Fig. S4 FT-IR spectra of PAN, PAN-GABA, PAN-GABA@Eu-MOF NFMs and Eu-MOF crystal

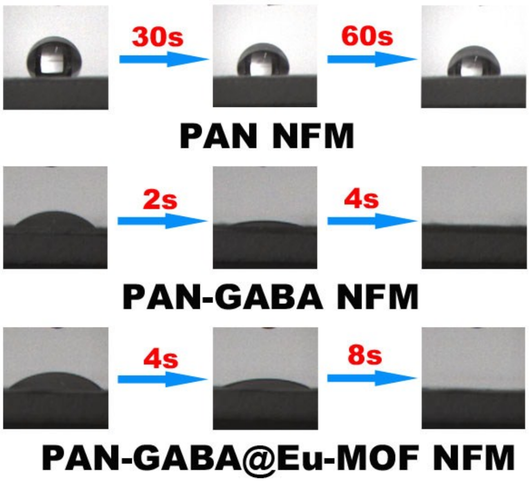


Fig. S5 Dynamic measurements of methanol permeation on the surface of PAN, PAN-GABA and PAN-GABA@Eu-MOF NFMs

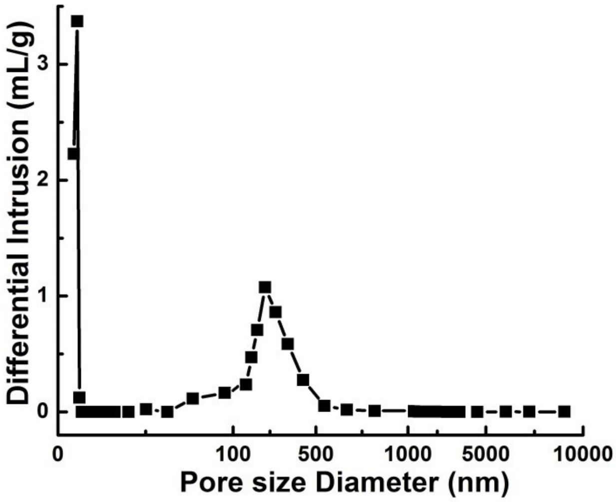


Fig. S6 Pore size distribution of PAN-GABA NFM

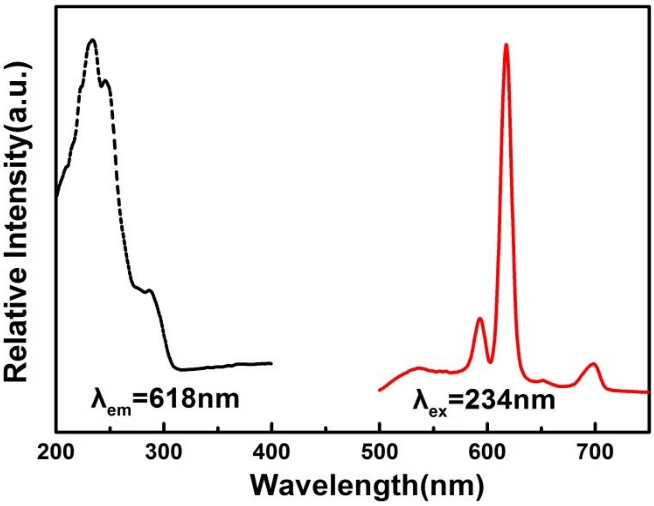


Fig. S7 Excitation (λ_{ex} = 234 nm) and emission (λ_{em} = 618 nm) spectra of PAN-GABA@Eu-MOF NFM.

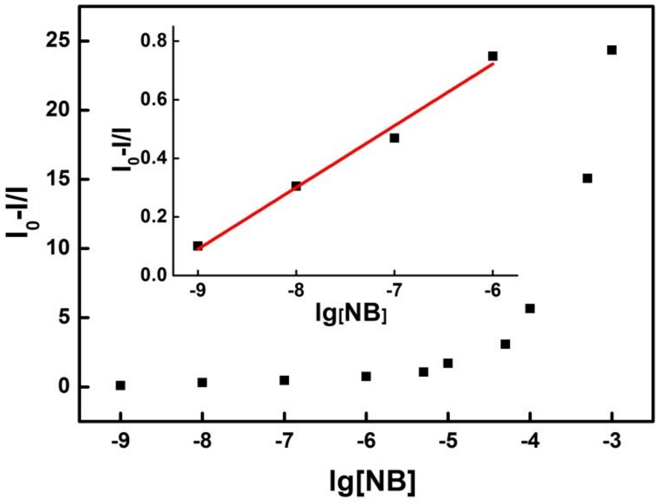


Fig. S8 Stern-Volmer plot for the response to NB.

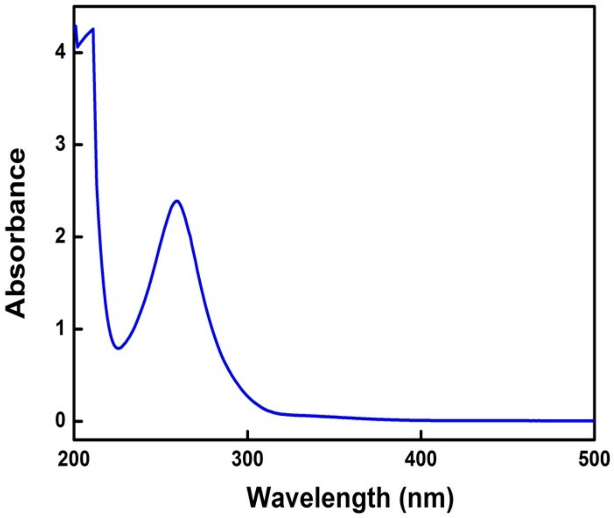


Fig. S9 UV-vis absorption spectra of NB in methanol

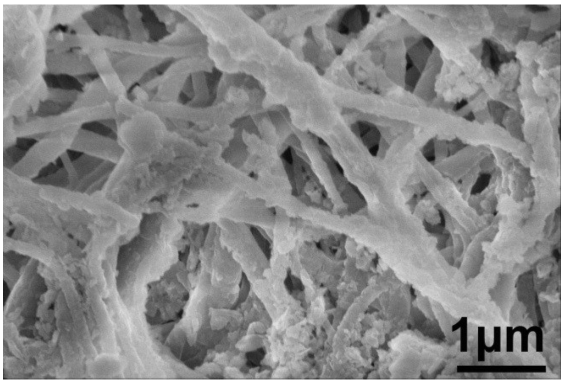


Fig. S10 SEM image of PAN-GABA@Eu-MOF NFM after a ten-cycle experiment

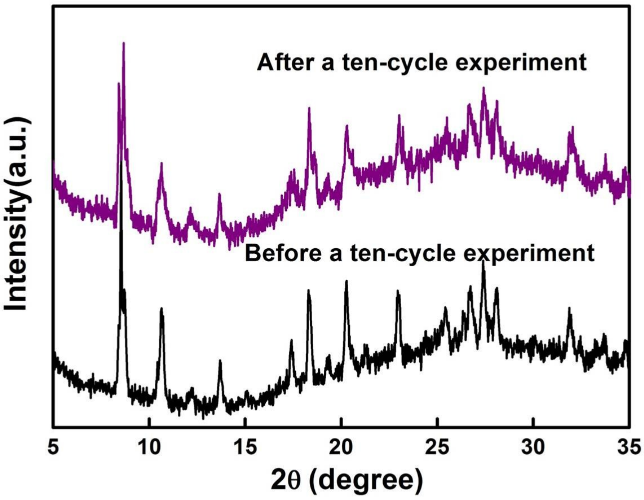
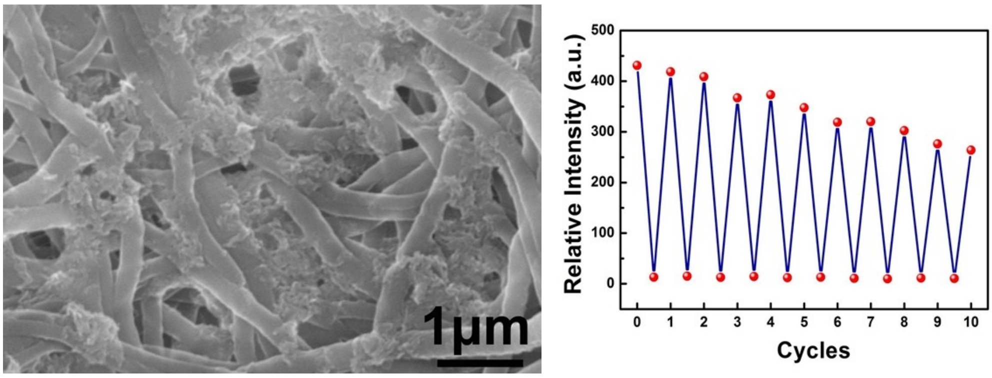


Fig. S11 PXRD pattern of PAN-GABA@Eu-MOF NFM before and after a ten-cycle experiment

(a) (b)

Fig. S12 The stability of Eu-MOF particles on the (a) PAN-GABA NFM and (b) PAN NFM after being washed with methanol during the regeneration process.



(a) (b)

Fig. S13 (a) SEM image of Eu-MOF/ PAN NFM after a ten-cycle experiment; (b) Performance of the Eu-MOF/ PAN NFM for the "off-on" fluorescence switching within 10 cycles.

References

1. M. Jurcic, W. J. Peveler, C. N. Savory, D. O. Scanlon, A. J. Kenyon and I. P. Parkin, *Journal of Materials Chemistry A*, 2015, **3**, 6351-6359.