Electronic supporting informations

A Luminescent Europium (III)-β-diketonate complex Hosted in Nanozeolite L as a Turn-On Sensor for Basic Molecules

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Experimental Section

Materials: 2-Thenoyltrifluoroacetone (TTA) was bought from Sigma-Aldrich and used as received. Nanozeolite L(NZ) were synthesized according to the procedure reported previously by using a starting mixture with the composition $5.40K_2O$-$5.50Na_2O$-$1.00Al_2O_3$-$30.00SiO_2$-$416.08H_2O$.[1] Solutions of $EuCl_3 \cdot 6H_2O$ in ethanol were prepared by dissolving Eu_2O_3 in concentrated hydrochloride acid. The host-guest composites $Eu^{3+}(TTA_n)$-NZL were prepared according to the procedure [2]and discribed as follows: 500mg of NZL was added to 15ml of a 0.1M ethanol solution of $EuCl_3 \cdot 6H_2O$ and stirred for 24h at 353K. The product (Eu^{3+}-NZL) was collected by centrifugation, washed with de-ionized water and dried in air at 343K. 200mg of Eu^{3+}-NZL was degassed and dried for 2 h at 423 K and then kept in contact with the TTA vapor at 393 K for 24 h. The obtained materials were washed with CH_2Cl_2 for three times in order to remove only physically adsorbed TTA, and dried at 40℃ in vacuum for 12 h.

Glass plates were dipped into an acid bath consisting of potassium dichromate and sulfuric acid for 12 h to remove possible organic residues on the surface. The plates were then washed with copious amounts of de-ionized water and dried at 80℃ in clean air for 3 h.

Exposure to various solvent: Powder samples of $Eu^{3+}(TTA_n)$-NZL were used for sensing experiments, the setup is shown below. For each experiment, 200 mg of $Eu^{3+}(TTA_n)$-NZL was put in a small bottle and exposed to various solvent vapors. The power and the small bottle were placed into a sealed container (about 100 ml), which contains about 5 ml of solvent for 1 h. And then the luminescence spectra of $Eu^{3+}(TTA_n)$-NZL, before and after exposed to the solvent vapors, were measured in a sample holder.

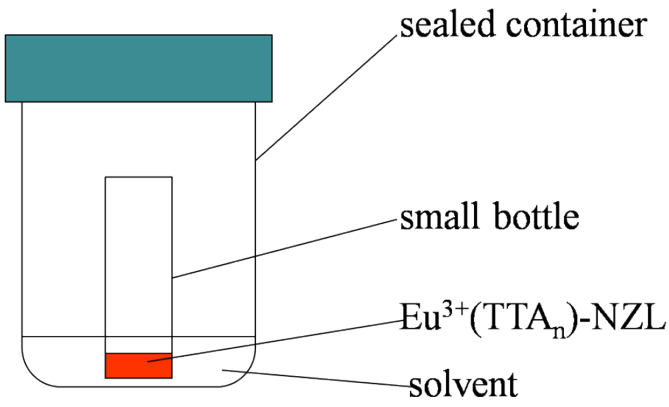

Diagram of the experimental setup for exposing $Eu^{3+}(TTA_n)$-NZL to different solvent vapors.

Preparation of film: 10 mg of $Eu^{3+}(TTA_n)$-NZL was dispersed in 5 mL of de-ionized water. The mixture was sonicated for 2 h to obtain a colloidal suspension which was kept for 5h. The thin film was formed by dropping the colloidal suspension on micro slide glasses, followed by evaporation of water at 60 ℃ in air.

Detection of the stability of $Eu^{3+}(TTA_n)$-NZL

Powder samples of $Eu^{3+}(TTA_n)$-NZL were alternatively exposure to FA–Et_3N cycles

Physical measurements: Infrared (IR) spectra were obtained with a Bruker Vector 22 spectrometer by using KBr pellets for solid samples from 400-4000 cm^{-1} at a resolution of 4 cm^{-1} (128scans collected).SEM images were obtained from a FE-SEM (Hitachi S-4300) at an acceleration voltage of 10 kV. X-ray diffraction patterns were taken on a on a Rigaku-Dmax 2500 diffractometer using Cu Kα1 radiation. The steady-state luminescence spectra and the lifetime

measurements were measured on an Edinburgh Instruments FS920P near-infrared spectrometer, with a 450 W xenon lamp as the steady-state excitation source, a double excitation monochromator (1800 lines·mm^{-1}), an emission monochromator (600 lines·mm^{-1}), a semiconductor cooled Hamamatsu RMP928 photomultiplier tube. A microsecond flash lamp (pulse length: 2 μs) was used as the excitation source for the lifetime measurements. Photons were collected up to 10 ms until maximum of 10^4 counts. Decay curves were fitted according to a bi-exponential function ($I=I_0+A_1 \exp(-t/\tau_1) + A_2\exp(-t/\tau_2)$). The decay times reported are accordingly the average decay times $<\tau>$.

1(a) A. Z. Ruiz, D. Brühwiler, T. Ban and G. Calzaferri, *Monatshefte für Chemie/Chemical Monthly*, 2005, **136**, 77; (b) S. Megelski and G. Calzaferri, *Advanced Functional Materials*, 2001, **11**, 277.

2 H. Li, W. Cheng, Y. Wang, B. Liu, W. Zhang and H. Zhang, *Chemistry-A European Journal*, 2010, **16**, 2125.

Spectra

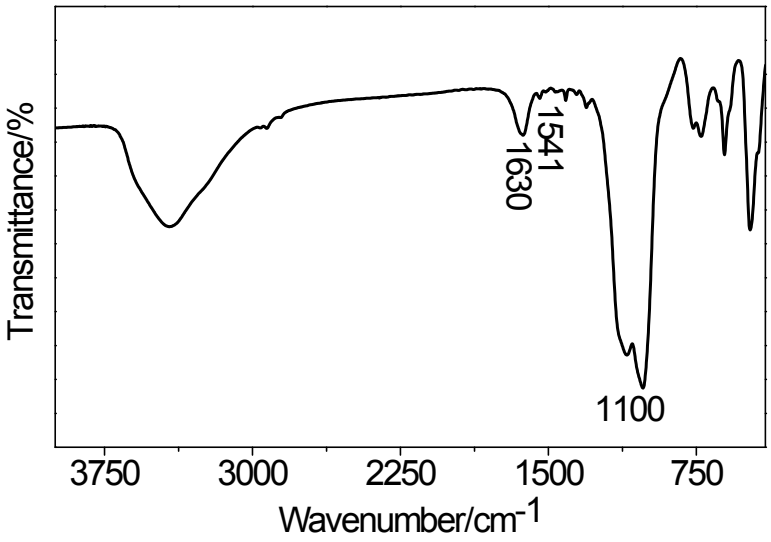

Fig. S1. FT-IR spectrum of $Eu^{3+}(TTA_n)$-NZL

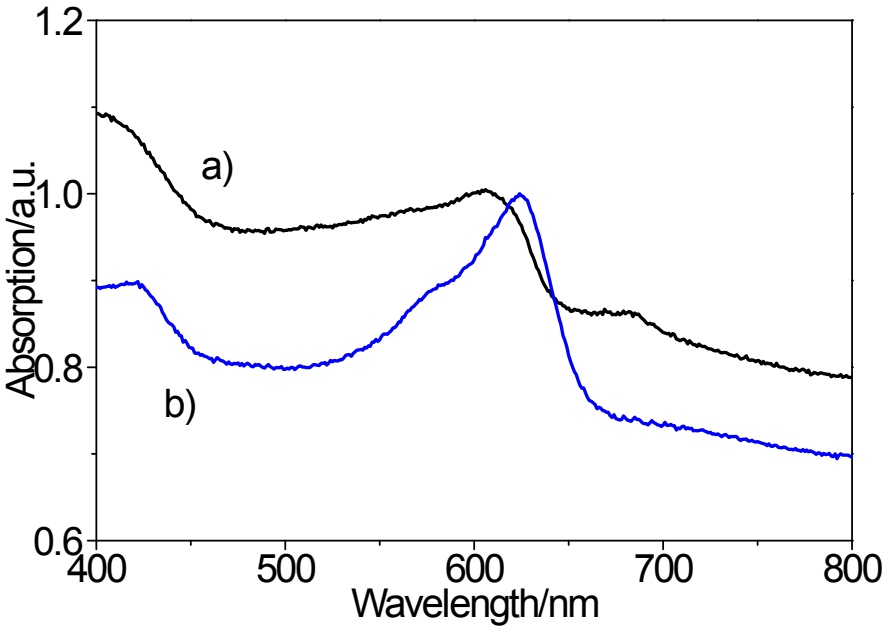

Fig.S2 UV-VIIS absorption spectra of thionine in $Eu^{3+}(TTA_n)$-NZL (a) and Et_3N vapor-treated $Eu^{3+}(TTA_n)$-NZL (b).

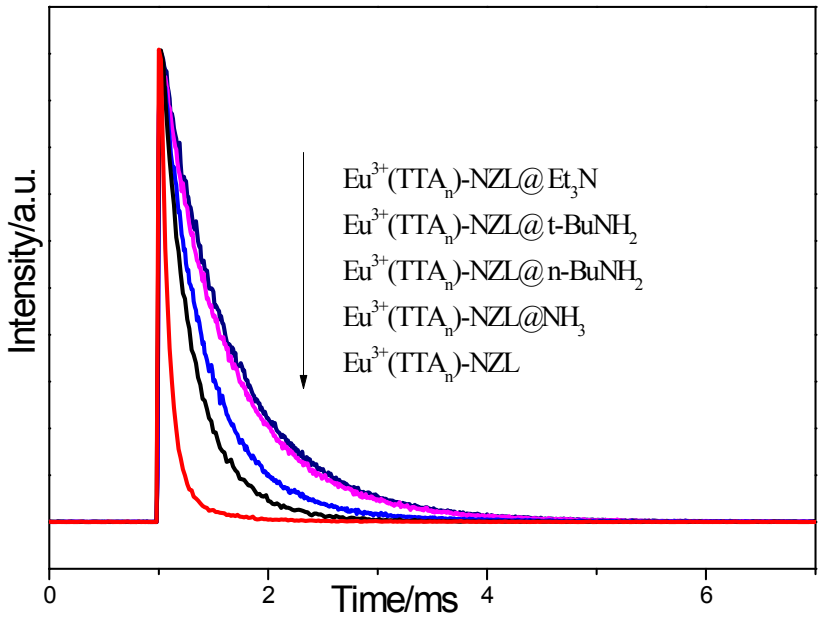

Fig.S3. Decay curves of $Eu^{3+}(TTA_n)$-NZL after exposure to various vapors for 1h measured at room temperature using an excitation of 345 nm and monitored around the most intense emission line at 612 nm, which can be well-fitted by a bi-exponential function.

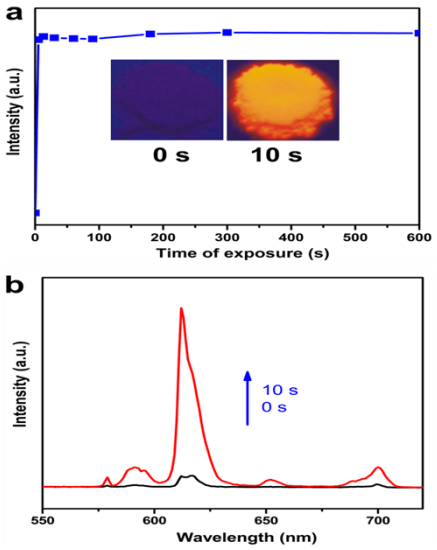

Fig. S4. (a)Time-dependent emission of $^5D_0 \rightarrow {}^7F_2$ transition at 612 nm enhancement by Et_3N vapor, Inset: Digital photos of $Eu^{3+}(TTA_n)$-NZL before and after exposure of Et_3N taken under UV illumination. (b) Corresponding emission spectra before and after exposure of Et_3N.

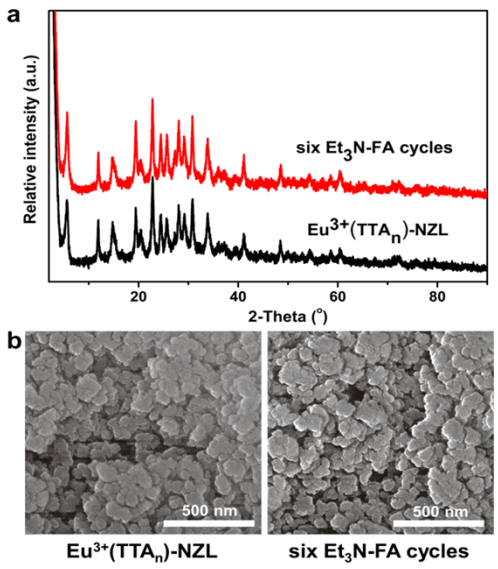

Fig. S5. XRD patterns (a) and (b) SEM images of $Eu^{3+}(TTA_n)$-NZL before and after six Et_3N-FA vapor exposure cycles