Supporting Information

Carbon nanodot induced Eu^{3+}-based fluorescent polymeric hydrogel for phase-separation absorption of VOC

Heng Li, Jiangbo Guo, Jujie Ren, Yajuan Li*, Xudong Yu*

Hebei Provincial Key Laboratory of Photoelectric Control on Surface and Interface, and College of Science, Yuhua Road 70, Shijiazhuang 050080, PR China

E-mail for corresponding author: liyajuan0820@163.com (Y. Li); chemyxd@163.com (X. Yu)

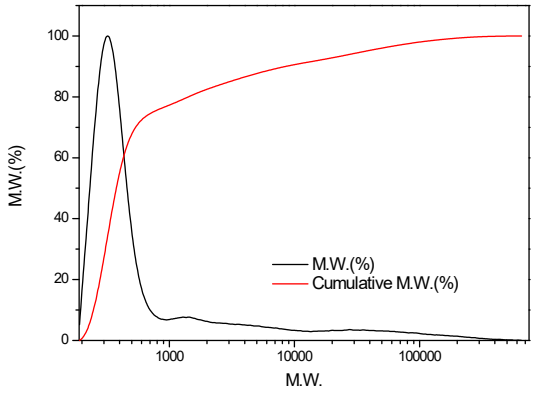

Figure S1 GPC spectrum of PEI.

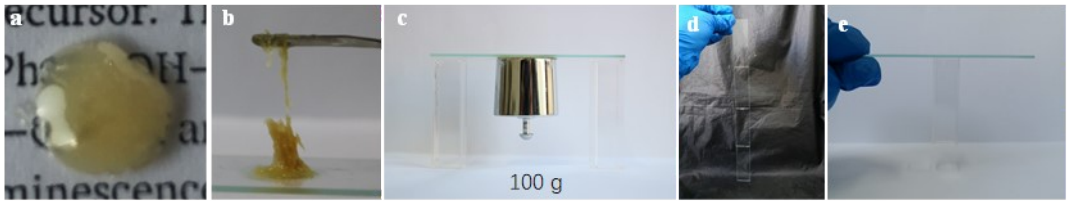

Figure S2 Photos of Eu^{3+}/TTA@PEI-LysTPY and its adhesive properties.

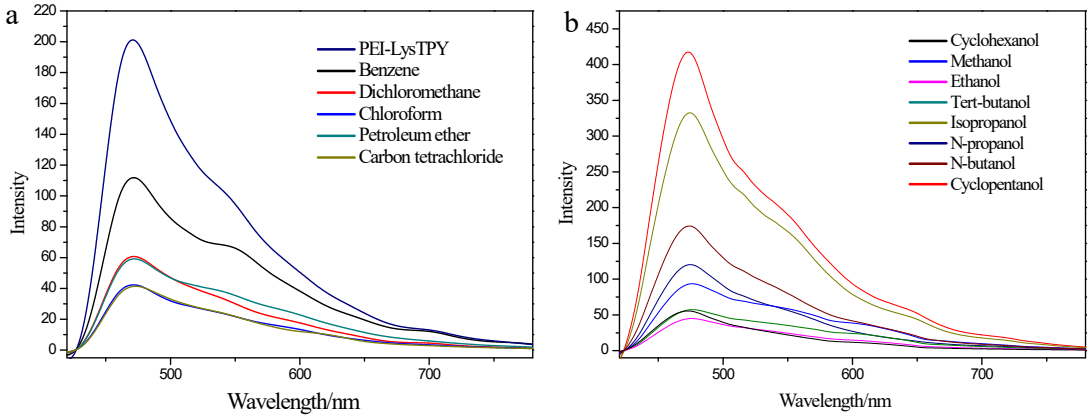

Figure S3 Fluorescence spectra of Eu^{3+}/TTA@PEI-LysTPY mixture in different kind of organic solvents.

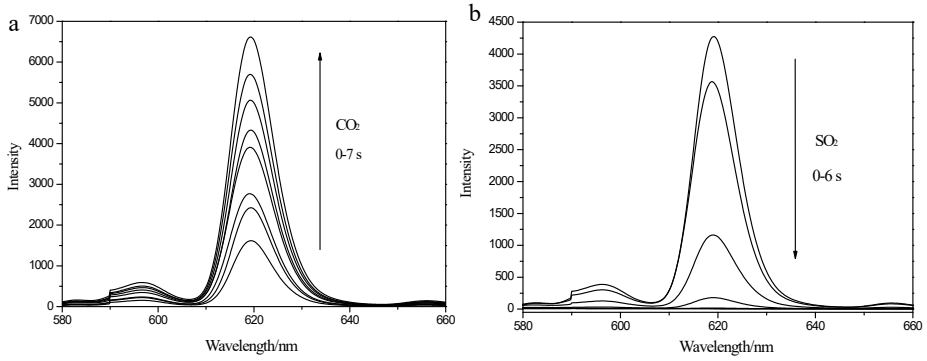

Figure S4 The gradual fluorescence enhancement and quenching processes of Eu^{3+}/TTA@PEI-LysTPY in water (5 mg $Eu(NO_3)_3$, 1 mg TTA and 30 mg PEI-LysTPY

in 2mL water) controlled by CO_2 and SO_2.

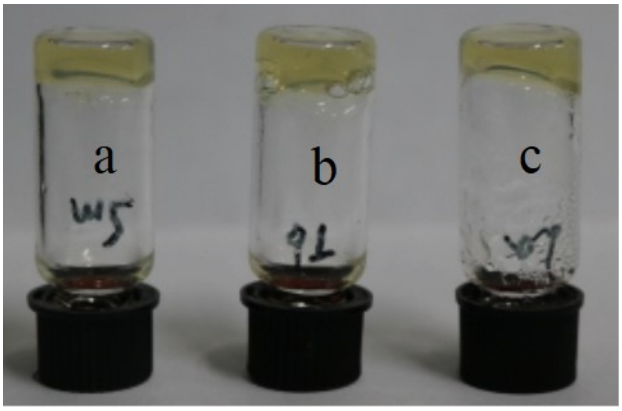

Figure S5 Photos of PEI-LysTPY (30 mg) based hydrogels (200 μL water) in the presence of Ln ions (5 mg) and TTA (1 mg). (a) $Sm(NO_3)_3$; (b) $Tb(NO_3)_3$; (c) $La(NO_3)_3$.

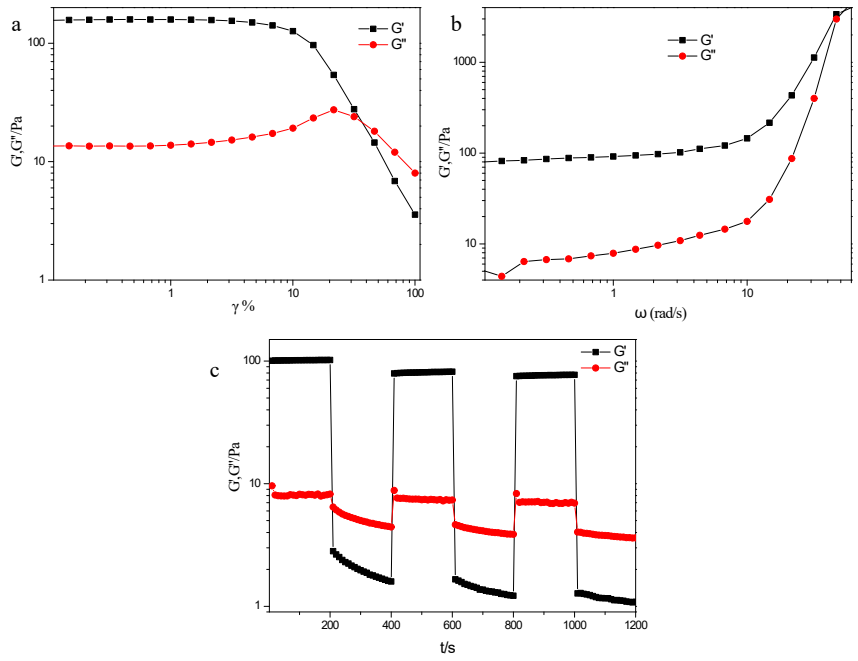

Figure S6 Rheological test of Eu^{3+}/TTA@PEI-LysTPY hydrogel (obtained at 130 °C). Amplitude scanning rheogram (a) and Frequency sweep rheogram (b) of Eu^{3+}/TTA@PEI-LysTPY hydrogel; (c) Recovery test of Eu^{3+}/TTA@PEI-LysTPY hydrogel by alternating strain of 1% and 100%.

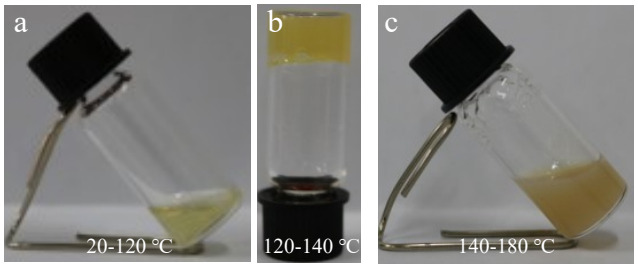

Figure S7 Status of Eu^{3+}/TTA@PEI-LysTPY aggregations at different temperature ranges.

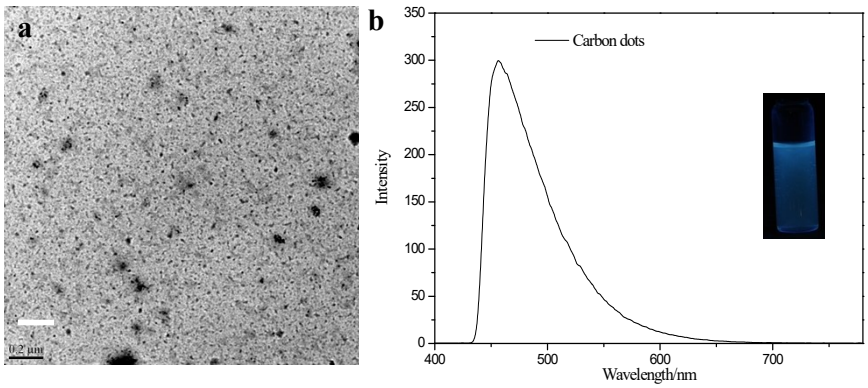

Figure S8 (a) TEM image of carbon dots, Scale bar: 200 nm; (b) Fluorescence spectrum of carbon dots in water; insert picture: photos of carbon dots in water in dark (irradiated by 365 nm).

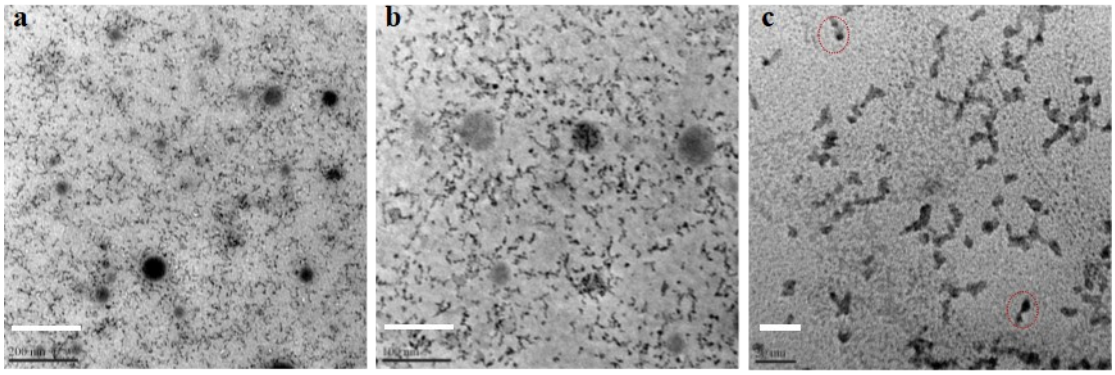

Figure S9 (a-c) TEM images of Eu^{3+}/TTA@PEI-LysTPY suspensions that heated to 170 °C. Irregular carbon dots were cross-linked by organic assembly on the surface of carbon dots. (b) was the magnification picture of (a), (c) was the magnification picture of (b). Scale bar: (a) 200 nm; (b) 100 nm; (c) 20 nm.

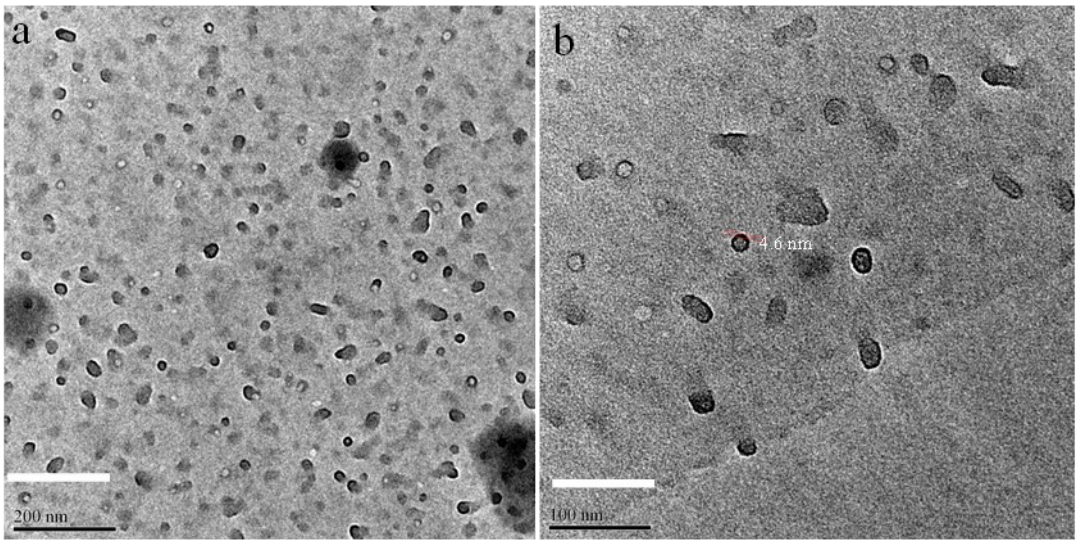

Figure S10 (a) TEM image of hollow carbon dots; (b) was magnification picture of (a). Scale bar: (a) 200 nm; (b) 100 nm.

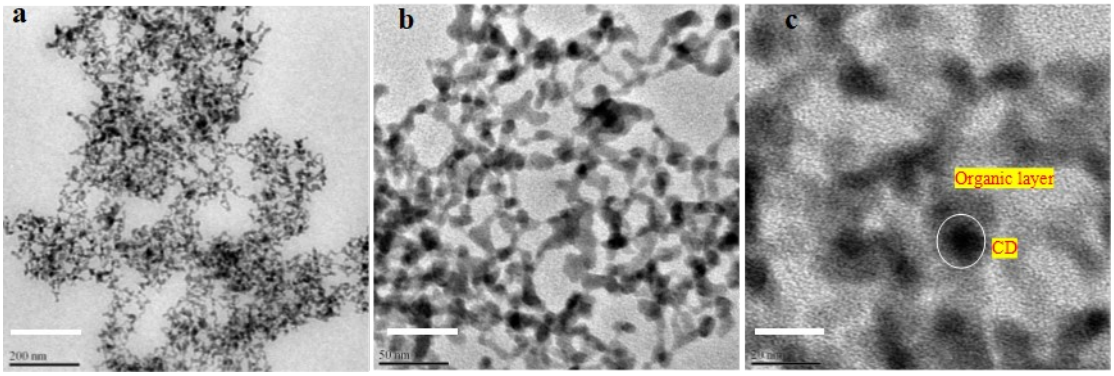

Figure S11 TEM images of Eu^{3+}/TTA@PEI aggregations (obtained at 140 °C). (b) was the magnification picture of (a), (c) was the magnification picture of (b). Scale bar: (a) 200 nm; (b) 50 nm; (c) 20 nm.

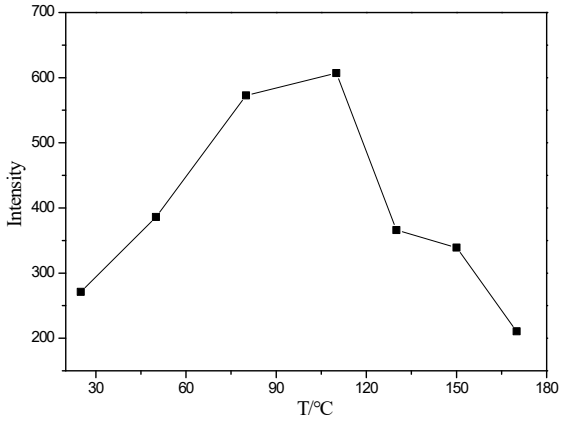

Figure S12 Fluorescence intensity values of Eu^{3+}/TTA@PEI-LysTPY aggregations at

620 nm at different temperatures.

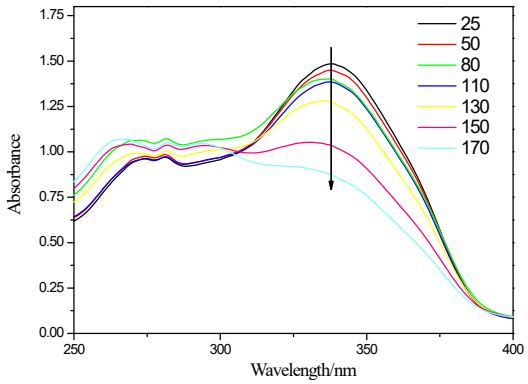

Figure S13 UV-vis of Eu^{3+}/TTA@PEI-LysTPY aggregations at elevated temperatures.

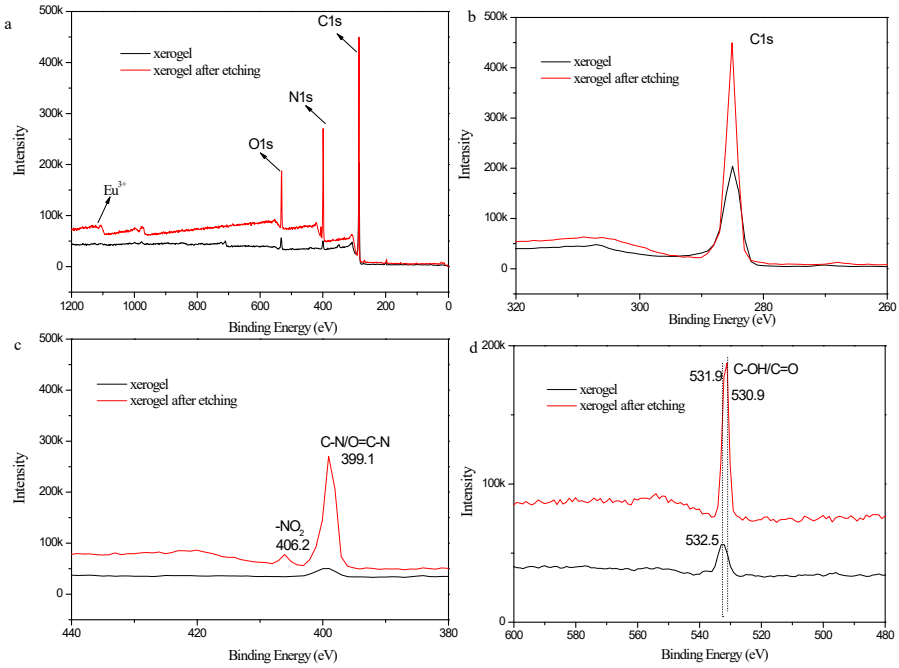

Figure S14 (a-d) XPS spectra of Eu^{3+}/TTA@PEI-LysTPY xerogel before and after etching by argon gas.

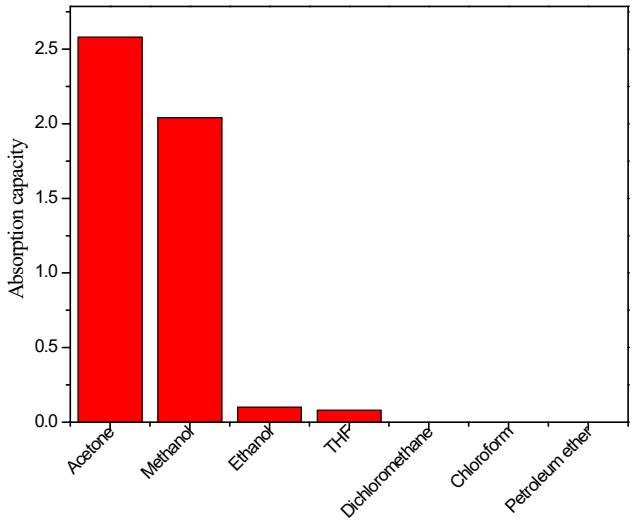

Figure S15 The absorption capacity (Unit: g g^{-1}) of the hybrid gels toward seven kinds of test organic solvents for four days.

Table S1 The mass and volume changes of the hydrogels and liquids on the gel surface toward absorption of acetone.

M_0	M_t	M_a	M_1	M_L	V_L
1g	3.58g	2.58 g	0.85g	2.73 g	3.40 mL

Calculation of acetone content in gel and liquid phases.

M_0, the initial mass of hydrogel before absorption of acetone; M_t: Total masses of the hydrogel and the liquid after adsorption equilibrium; M_1, the mass of hydrogel after adsorption equilibrium; M_L, the mass of liquid on the gel surface after adsorption equilibrium; V_L: the volume of the liquid on the gel surface after absorption equilibrium.

Based on the above data, the mass of acetone in liquid was calculated to be 1.97 g (M=2.73×72%=1.97 g); the mass of acetone in gel was calculated to be 0.62 g (Ma-M=2.58-1.96=0.62 g). Therefore, in the liquid on the gel surface, it had 76% acetone (mass fraction), and the hydrogel contained 24% acetone (mass fraction).

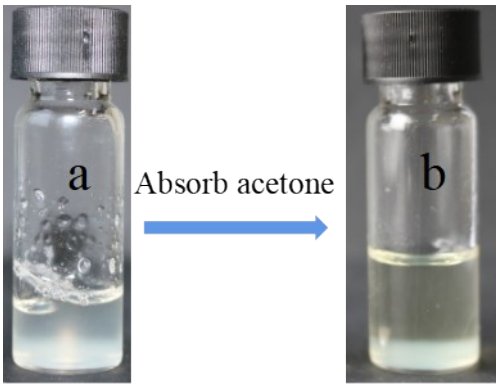

Figure S16 The diluted hybrid gel assembly before (a) and after (b) absorption of acetone.

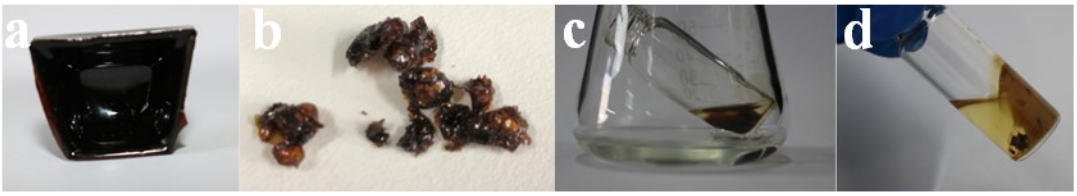

Figure S17 (a) and (b) Photos of Eu^{3+}/TTA@PEI-LysTPY solid treated with acetone; (c) Photos of the solid of (a) or (b) that absorbed water for 3 h, leading to a hydrogel, which was further utilized to absorb acetone; (d) Photos of hydrogel that absorbed acetone for 72 h.

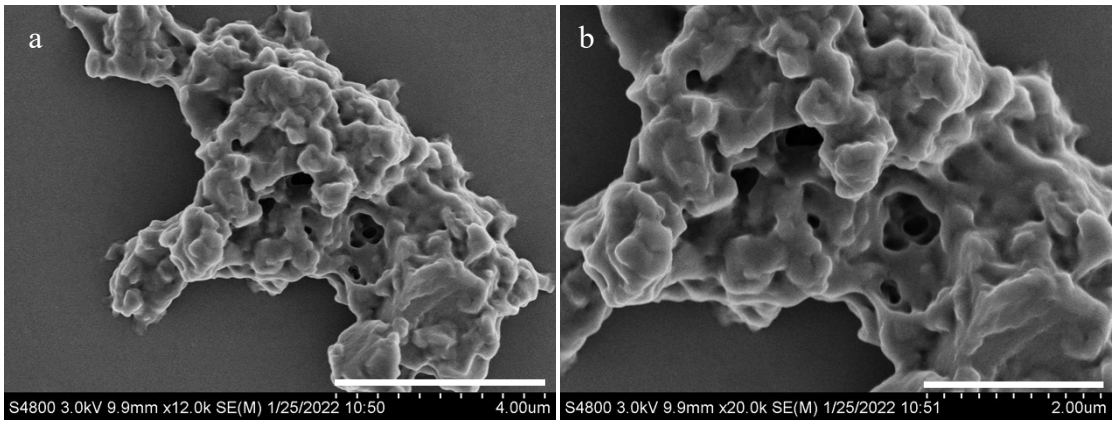

Figure S18 SEM images of Eu^{3+}/TTA@PEI-LysTPY hybrid hydrogel treated with acetone. (b) was the magnification picture of (a).

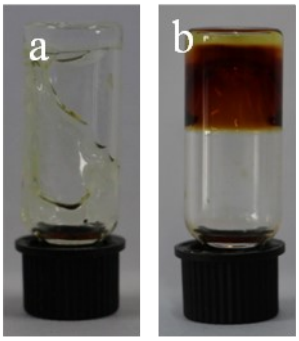

Figure S19 (a) Photos of PEI liquid; (b) Photos of PEI that absorbed acetone for 72 h.