Supporting Information

An efficient and sensitive fluorescent pH sensor based on amino functional metal-organic frameworks in aqueous environment

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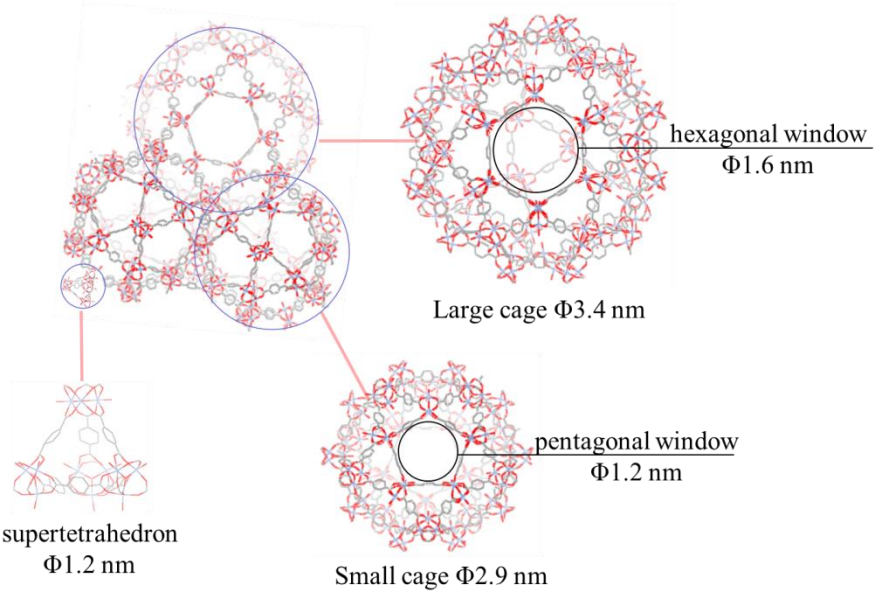

Fig. S1 Ball-and-stick view of two cages and free dimensions (nm) of the pentagonal and hexagonal windows. Amino groups in the ligand have been ignored.

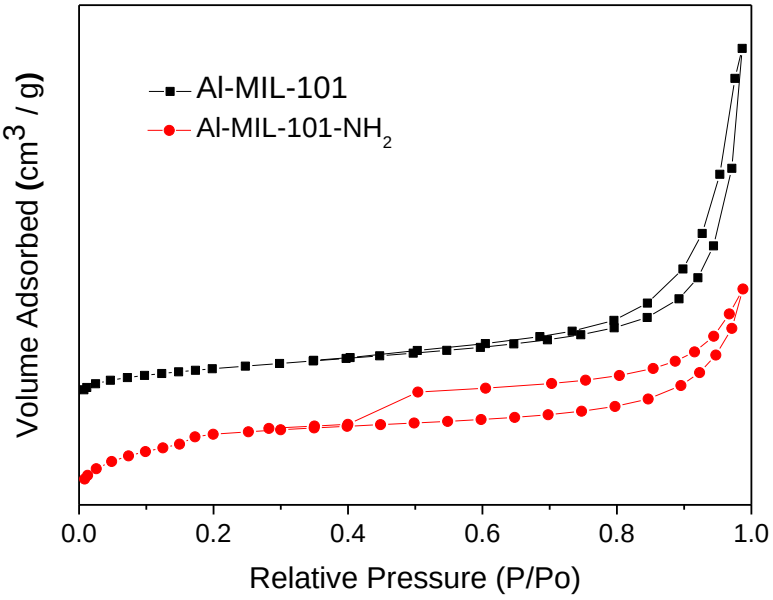

Fig. S2 N_2 adsorption-desorption isotherm at 77 K of Al-MIL-101-NH_2 and Al-MIL-101. The BET surface area and N_2 sorption isotherms are a bit different from those in the previous reports.[1] The difference could be attributed to: i) the similar synthetic approach but may be different reaction vessel (which is not mentioned in references); ii) the interparticle voids as the small MOF particles stack together; iii) the trapped DMF molecules which may slow down the desorption kinetics due to free-NH_2 in the pore of MOFs.

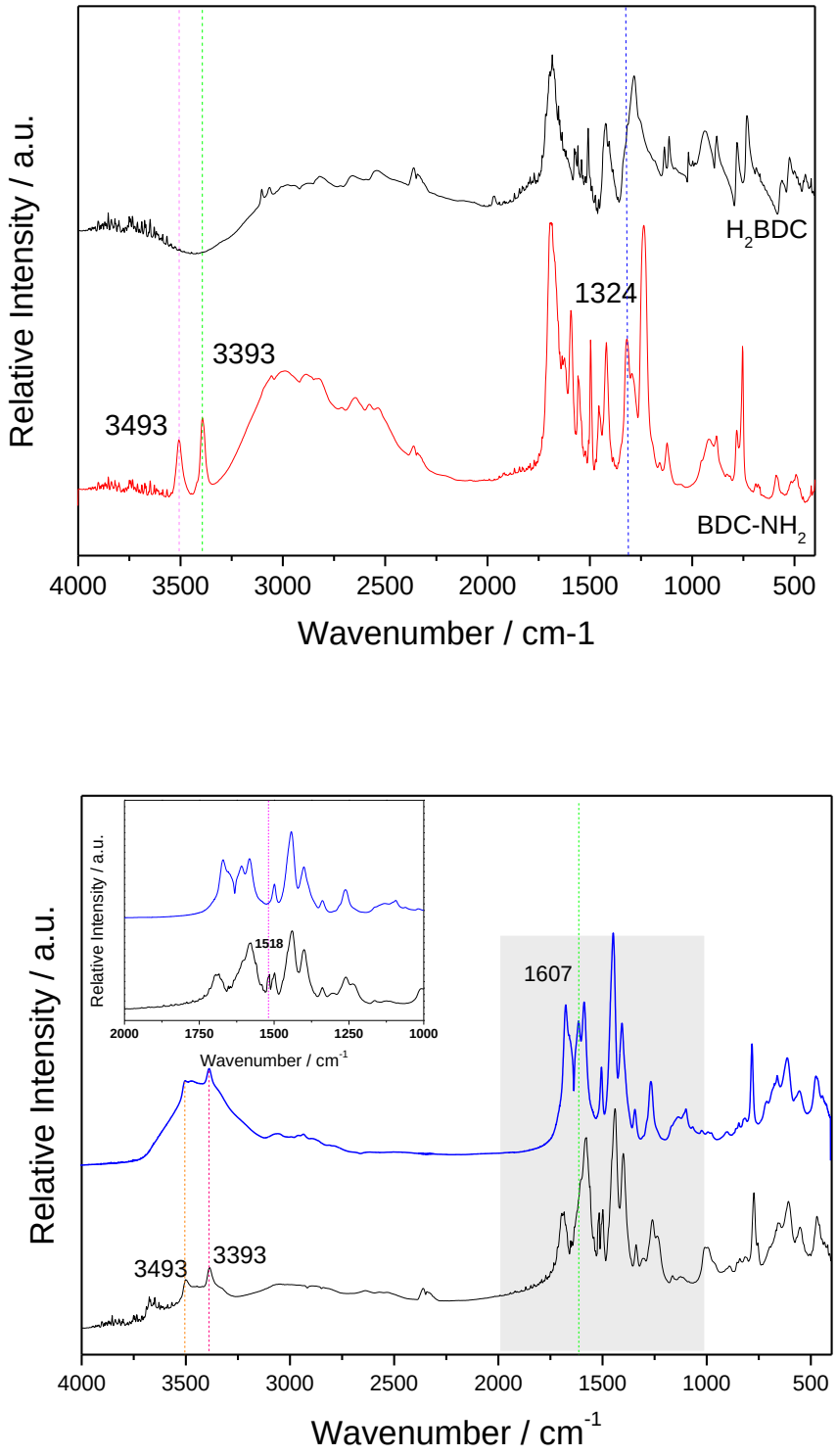

Fig. S3 FTIR spectrum of Al-MIL-101-NH_2 and Al-MIL-101 (a) and FTIR spectrum of Al-MIL-101-NH_2 in aqueous solution of pH = 4 and 7 (b).

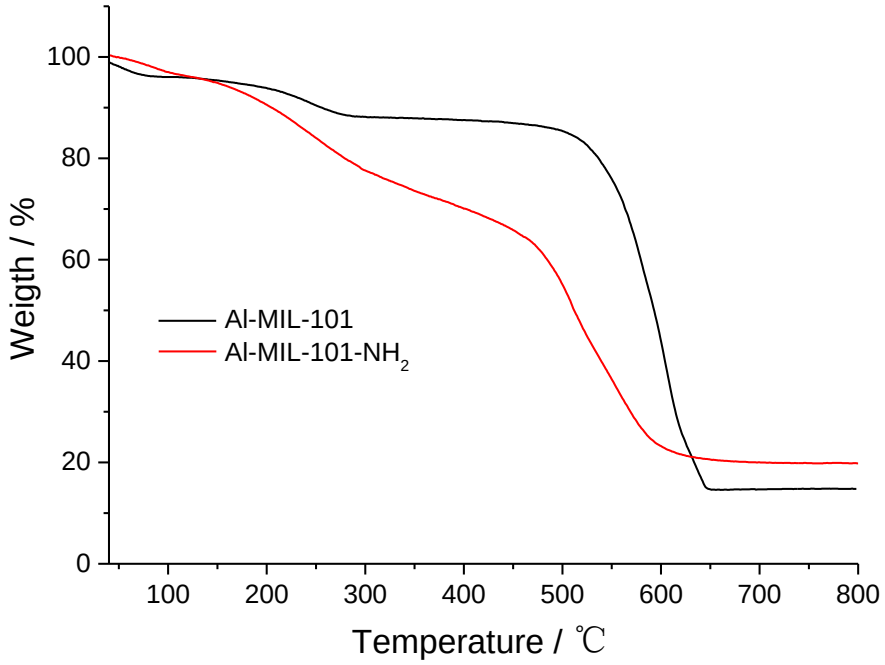

Fig. S4 Thermogravimetric analysis of Al-MIL-101-NH_2 and Al-MIL-101 in N_2 at a heating rate of 5 K/min.

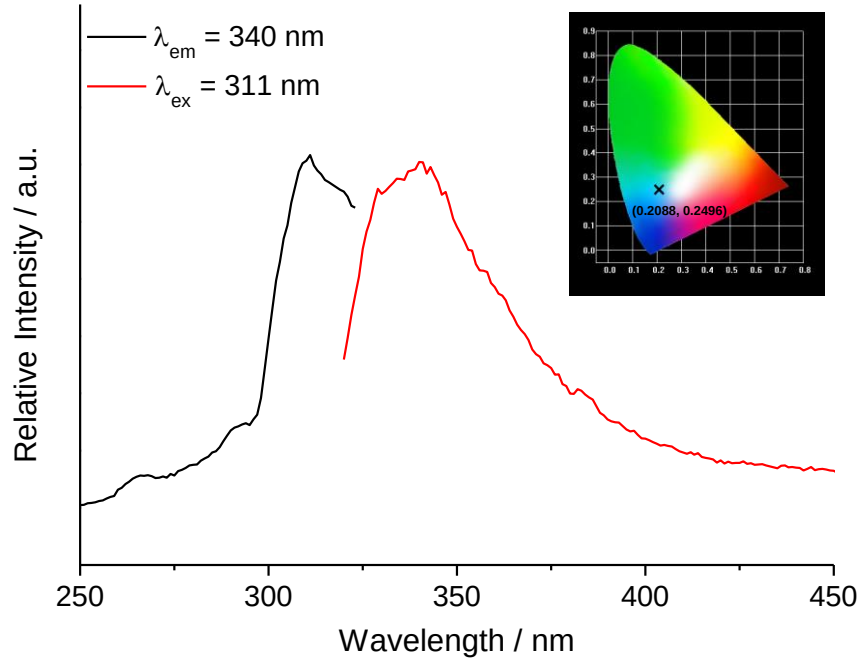

Fig. S5 Excitation and emission spectra of Al-MIL-101. The inset is thecorresponding CIE chromaticity diagram.

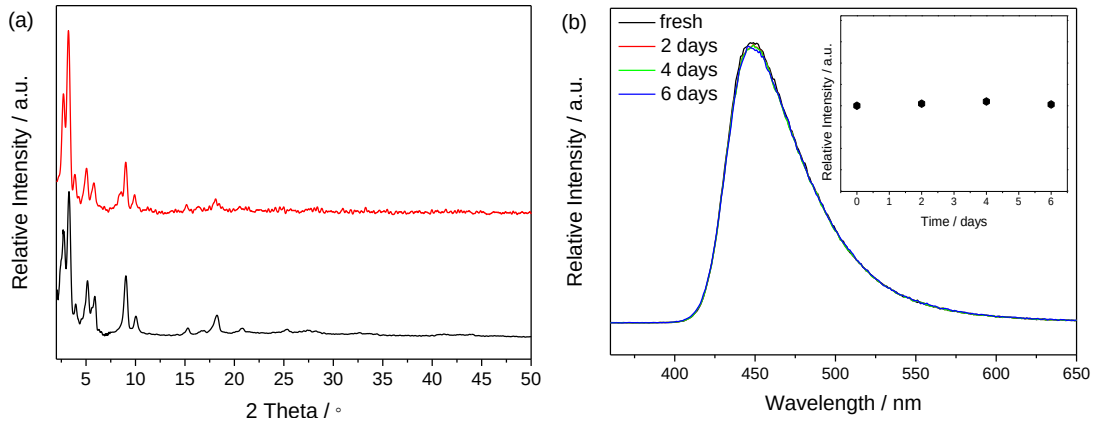

Fig. S6 (a) PXRD patterns of Al-MIL-101-NH_2: (black line) as-synthesized; (red line) after treatment in H_2O for 48 h; (B) Stability of fluorescent intensity of Al-MIL-101-NH_2 after 6 days' storage in H_2O.

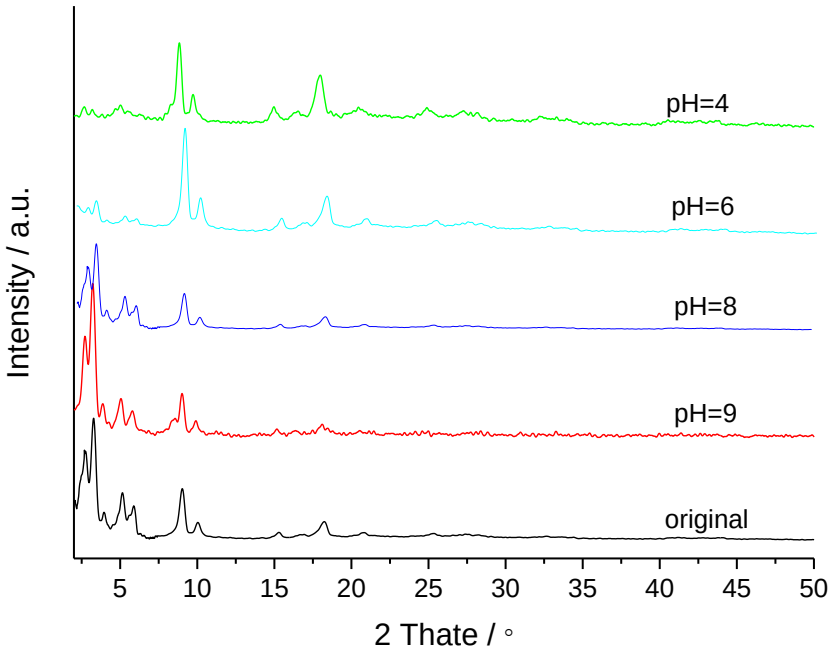

Fig. S7 Powder X-ray diffraction (PXRD) profiles for orginal and Al-MIL-101-NH2 samples soaked in aqueous solutions with pH values of 4, 6, 8 and 9.

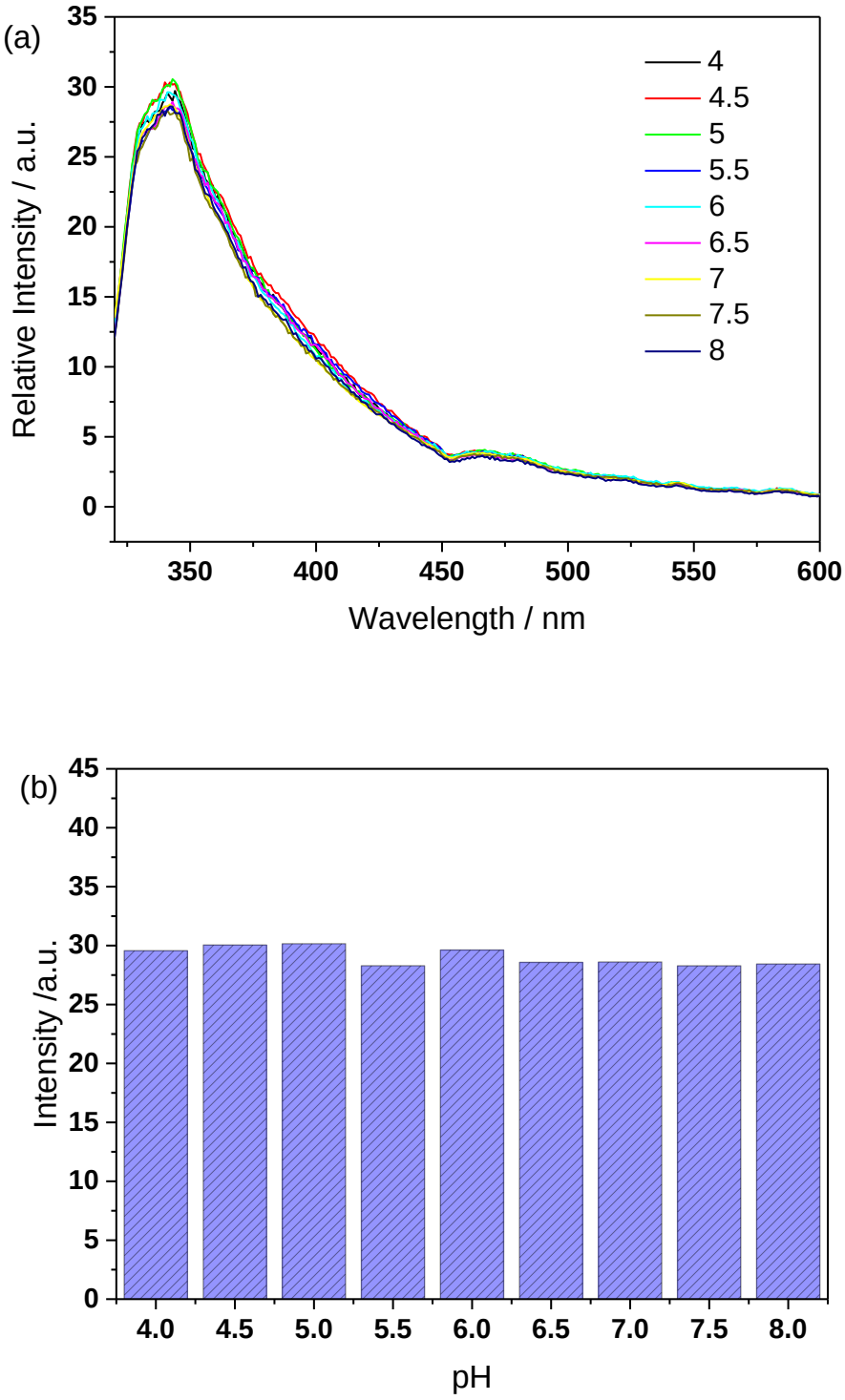

Fig. S8 (a) Suspension-state PL spectra and (b) the relative intensity of 340 nm for Al-MIL-101 dispersed in aqueous solution of different pH when excited at 311 nm.

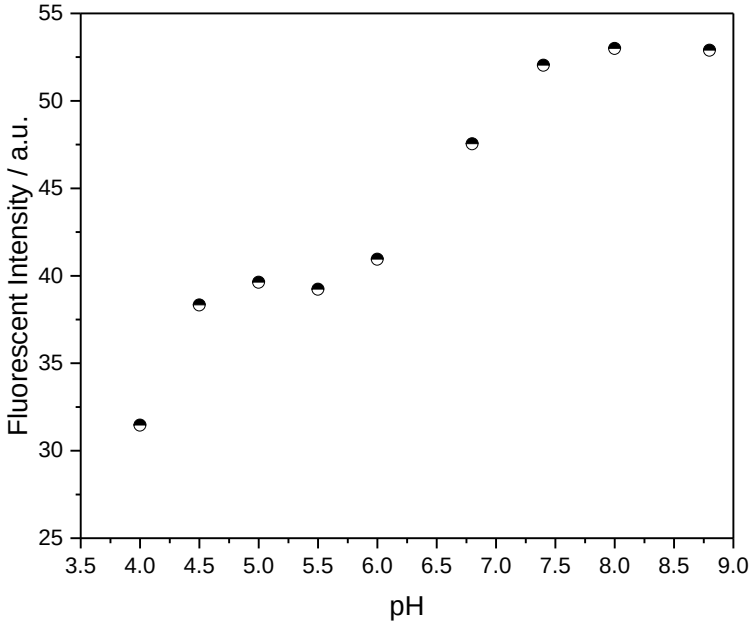

Fig. S9 Dots showed fluorescence emission at 451 nm of Al-MIL-101-NH_2 at different pH.

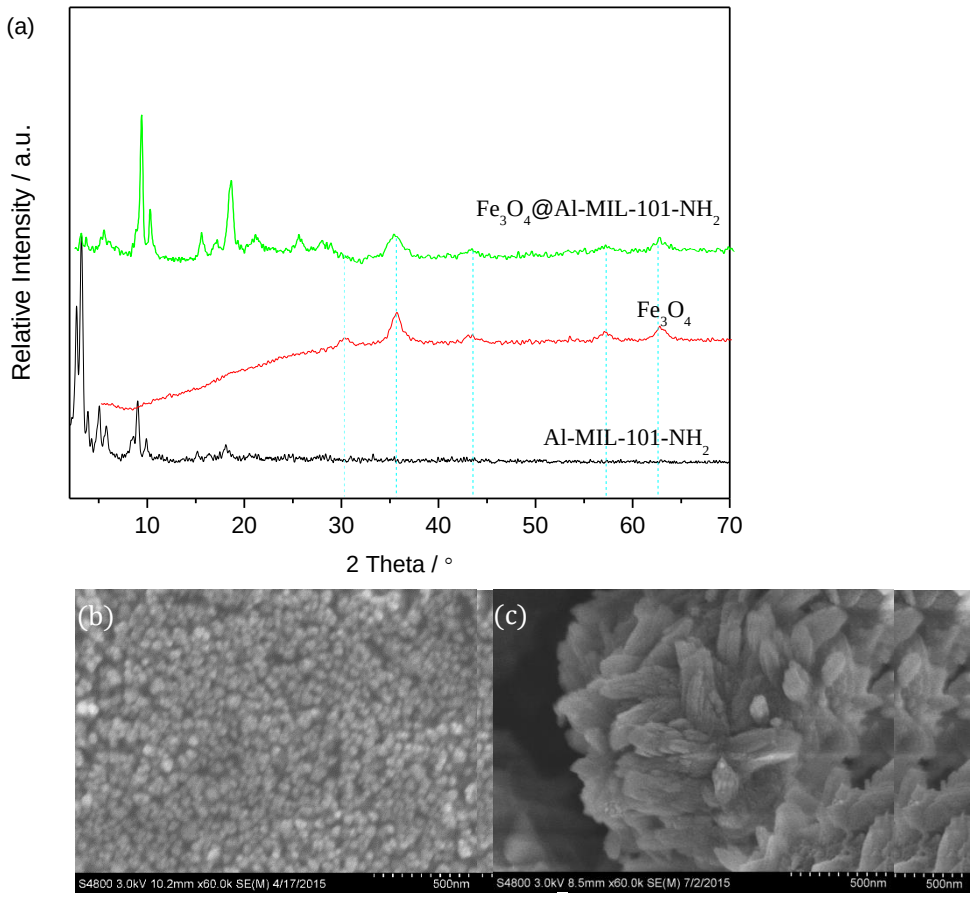

Fig. S10 (a) PXRD patterns of Al-MIL-101-NH_2 (black line), Fe_3O_4 (red line) and Fe_3O_4@ Al-MIL-101-NH_2 (green line). SEM images of Fe_3O_4 (b) and Fe_3O_4@Al-MIL-101-NH_2 (c).

Table S1 EDX element analysis of Al-MIL-101-NH_2.

Materials	Element	Weight%	Atomic%
Al-MIL-101-NH_2	C	45.62	53.48
	O	10.30	10.34
	N	36.50	32.20
	Al	7.59	15.93

Table S2 The relative standard deviation (RSD) for six repetitive measurements of Al-MIL-101-NH_2 emission intensity in different pH.

pH	Numbers of assay	RSD(%)
4	6	2.32
5	6	1.89
6	6	1.96
7	6	2.01
7.7	6	1.76

Table S3 Chemical composition of PBS solution (g/L)

	Components	Contents (g/L)
Inorganic Salts	$CaCl_2$	--
	KCl	--
	KH_2PO_4	0.144
	$MgCl_2$ $6H_2O$	--
	NaCl	9.00
	Na_2HPO_4	0.795
	Na_2HPO_4 $7H_2O$	--
Organic Buffers	Tris Ultrapure	--