Supporting Information

A reversible, colorimetric, pH-responsive indole-based hydrogel and its application in urea detection

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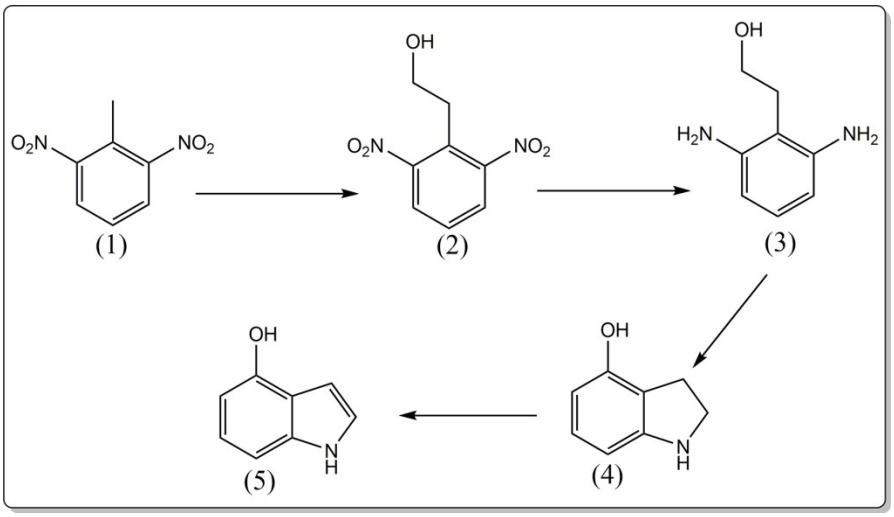
The synthetic route of 4-HIN was shown in Scheme S1.



Scheme S1 The synthetic process of 4-HIN.

Synthesis of 2,6-dinitrophenylethanol (2)

To a three-necked flask (100 mL) equipped with magnetic stirrer, an nitrogen outlet, inlet, and water-cooled condenser, 2,6-dinitrotoluene (100 mmol), paraformaldehyde (120 mmol), dimethyl sulfoxide (DMSO, 50 mL) were added. After stirring at room temperature for 10 min, potassium *t*-butoxide (16.4 mmol) was added in portions to the reaction flask. And then, the reaction mixture was heated to 75 °C under stirring for 1.5 h. The resulting solution was allowed to slowly cool to room temperature, and subsequently poured into cold water, filtered, washed with water and ethyl acetate several times, and then purified by column chromatography on 100-200 mesh silica gel with petroleum ether/ethyl acetate = 6:1 afford compound (2) (70% yield).

Synthesis of 2,6-diaminophenylethanol (3)

Compound (2) (40 mmol), ethyl alcohol absolute (80 mL), Pd/C (2 g) were added to a three-necked flask (100 mL) at room temperature. Hydrazine hydrate (85%, 200 mmol) was slowly added to the above reaction solution. Then, the reaction mixture

was heated to 75 °C under stirring for 5 h. The resulting solution was allowed to slowly cool to room temperature, and subsequently remove the solvent, filtered and washed with petroleum ether, and then recrystallized from methanol obtain compound (3) (84%).

Synthesis of 4-hydroxyporphyrin (4)

Compound (3) (65.7 mmol), phosphoric acid (70%, 714.4 mmol) were added to the sealed can. The reaction was carried out at 240 °C for 15 h. The pH value of the reaction solution was adjusted to 7.0 by using NaOH solution (0.1 M), and subsequently extracted with ethyl acetate several time, and washed with saturated brine, and then purified by column chromatography on 100-200 mesh silica gel with petroleum ether/ethyl acetate = 4:1 afford compound (4) (72% yield).

Synthesis of 4-HIN (5)

To a three-necked flask (100 mL) equipped with magnetic stirrer and water-cooled condenser, compound (4) (5 mmol), Pd/C (1 g), o-xylene (150 mL) were added. The reaction mixture was heated to 160 °C under stirring for 5 h. The resulting solution was allowed to slowly cool to room temperature, and subsequently evaporated, and then purified by column chromatography on 100-200 mesh silica gel with petroleum ether/ethyl acetate = 4:1 afford 4-HIN (80% yield).

FT-IR spectrum (KBr pellet, cm^{-1}): 3358, 3275, 1580, 1490, 1450, 1344, 1035, 720;

UV-vis spectrum (H_2O, nm): 215, 260, 278, 286;

^1H NMR (400 MHz, $CDCl_3$), δ=10.90 (s, 1H), 9.25 (s, 1H), 7.14 (t, 1H, J=2.7 Hz), 6.85 (d, 2H, J=8.1, 7.1 Hz), 6.47 (t, 1H, J= 2.4 Hz), 6. 38 (d, 1H, J =1.9 Hz).

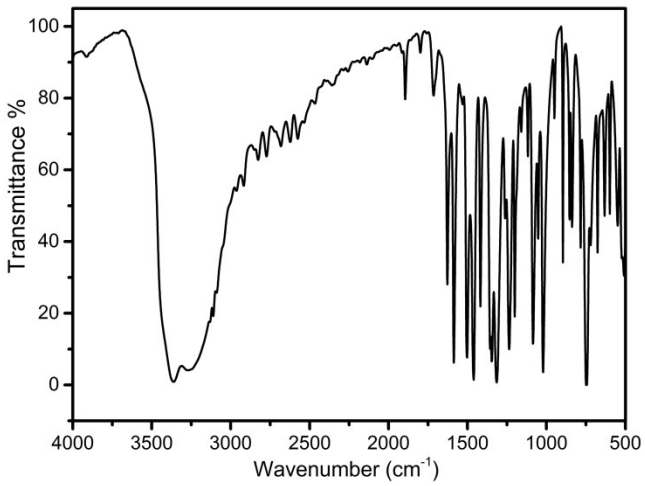


Fig. S1 FT-IR spectrum of 4-HIN.

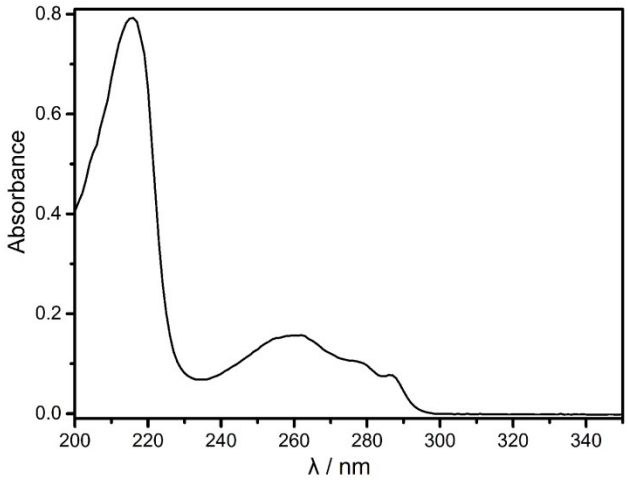


Fig. S2 UV-vis spectrum of 4-HIN.

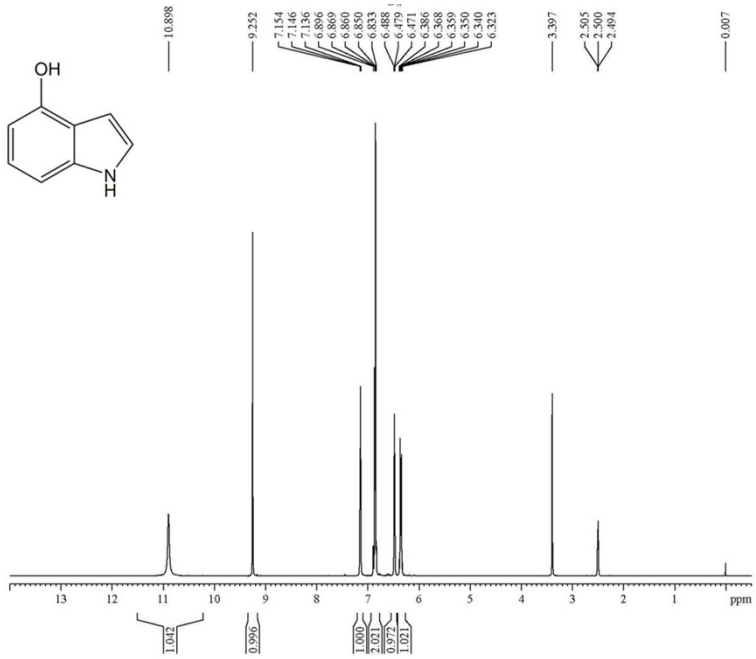


Fig. S3 ^{1}H NMR spectrum of 4-HIN.

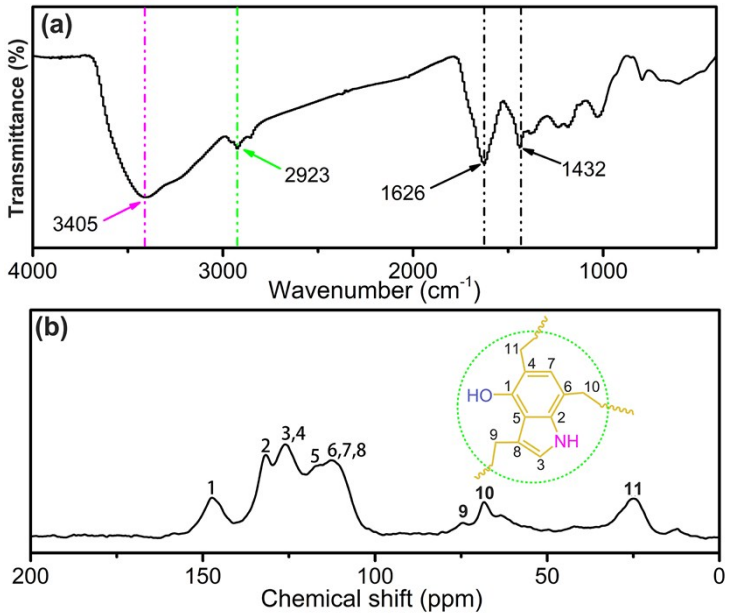


Fig. S4 (a) FT-IR spectrum and (b) ^{13}C NMR spectrum of 4-HINF hydrogel.

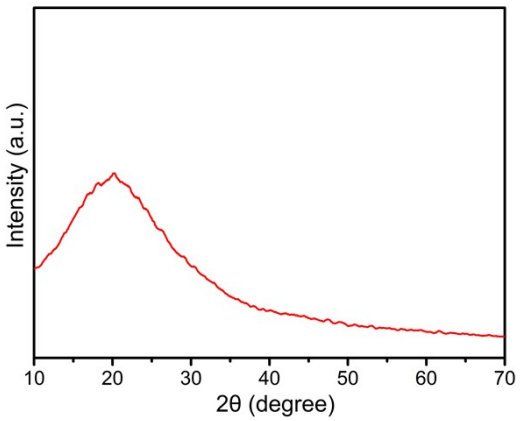


Fig. S5 XRD spectrum of 4-HINF hydrogel.

Table S1 Rheological properties of 4-HINF hydrogel.

t_g (min)	G' (Pa)	G'' (Pa)	η*, (Pa s)
30	1.6	1.6	0.35