Electronic Supplementary Information for

A Visual Test Paper based on Pb(II) Metal-Organic Nanotube Utilized as H2S Sensor with High Selectivity and Sensitivity

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CONTENTS
1. Materials and methods. ......................................................................................................2
2. Synthetic strategy. .............................................................................................................2
3. PXRD of CD-MONT-2. ........................................................................................................2
4. PXRD of CD-MONT-2' test papers. ....................................................................................3
5. The decrease of fluorescence intensities with the increasement of Na2S.............................3
6. Fluorescent spectra of the CD-MONT-2' in H2O with different substances. .........................4
7. The relative fluorescent intensity of I0/I at 432 nm with 5 µM of Na2S, and 50 µM of inorganic salts, reducing agents, amino acids and ROS.............................................................5
8. The XPS spectra of Pb, C and O of CD-MONT-2' and CD-MONT-2'-derivatives. ............5
9. FTIR spectra of beta-CD, CD-MONT-2' and CD-MONT-2'-derivatives. .........................6
10. TEM image and SEAD of obtained CD-MONT-2' and CD-MONT-2'-derivatives. ..........6
1. **Materials and methods.** All chemicals and solvents are purchased and used as received without further purification. 'BuOOH could be used to induce ROS. The H₂S gas was made by the reaction of FeS and H₂SO₄ (H₂SO₄ : H₂O = 2 : 3 [v/v]) in a flask, and collected in a flask of 150 ml for an hour through a desiccant of P₂O₅ and waste gas is absorbed by a NaOH solution at the end of equipment.

2. **Synthetic strategy:** PbCl₂ (0.80 mmol, 0.2250 g) and β-cyclodextrin (β-CD) (0.10 mmol, 0.1150 g) were suspended in 30 mL distilled water, and then stirred at 80 °C for an hour. The mixture is cooled to room temperature and filtered. The obtained solution is transformed to glass vial with a diameter of 1.6 centimeter, and then the vial was cooled to 4 °C to make cyclohexanol become solid state. Subsequently, the triethylamine was layered onto the solid cyclohexanol, and the vial was sealed and heated at 110 °C for 50 hours. After cooling, the colourless rod-like crystals were collected by filtration and washed with water.

3. **PXRD of CD-MONT-2.**

![PXRD patterns of simulated based on crystal data, as-synthesized and after heated at 120 °C for an hour.](image)

**Fig. S1** PXRD patterns of simulated based on crystal data, as-synthesized and after heated at 120 °C for an hour.
4. PXRD of CD-MONT-2’ test papers.

![PXRD patterns of the simulated one from single-crystal data of CD-MONT-2, CD-MONT-2’ and CD-MONT-2’-based test papers.](image)

Fig. S2 PXRD patterns of the simulated one from single-crystal data of CD-MONT-2, CD-MONT-2’ and CD-MONT-2’-based test papers.

5. The decrease of fluorescence intensities with the increasement of Na$_2$S

![The decrease of fluorescence intensities with the increasement of Na$_2$S.](image)

Fig. S3 The decrease of fluorescence intensities with the increasement of Na$_2$S.
Fluorescent spectra of the CD-MONT-2’ in H$_2$O with different substances.

Fig. S4 Fluorescent spectra of 1 mg/mL CD-MONT-2’ in H$_2$O treated with: a) tBuOOH, b) Na$_2$CO$_3$, c) Na$_2$SO$_4$, d) THU, e) L-Cys, f) Gln, g) NaClO, h) Glucose, i) H$_2$O$_2$, j) NaCl, k) DL-Tyr, l) KCl, m) NaH$_2$PO$_4$, n) GSH, o) CH$_3$COONa, p) Na$_2$SO$_3$, q) KCl, and r) KI.
7. The relative fluorescent intensity of \( I_0/I \) at 432 nm with 5 \( \mu \text{M} \) of \( \text{Na}_2\text{S} \), and 50 \( \mu \text{M} \) of inorganic salts, reducing agents, amino acids and ROS.

![Graph showing relative fluorescent intensity](image)

**Fig. S5** The relative fluorescent intensity of \( I_0/I \) at 432 nm with 5 \( \mu \text{M} \) of \( \text{Na}_2\text{S} \), and 50 \( \mu \text{M} \) of inorganic salts, reducing agents, amino acids and ROS.

8. The XPS spectra of Pb, C and O of CD-MONT-2’ and CD-MONT-2’-derivatives.

![XPS spectra images](image)

**Fig. S6** The XPS spectra of a) Pb 4f, b) C 1s and c) O 1s of CD-MONT-2’; the XPS spectra of d) C 1s and e) O 1s of CD-MONT-2’-derivatives.

Fig. S7 FTIR spectra of beta-CD a), CD-MONT-2’ b) and CD-MONT-2’-derivatives c).

10. TEM image and SEAD of obtained CD-MONT-2’ and CD-MONT-2’-derivatives.

Fig. S8 TEM image and SEAD of obtained CD-MONT-2’ (a, b and c) and CD-MONT-2’-derivatives (d, e and f).