Electronic Supplementary Information (ESI) for

A Highly Selective and Sensitive Fluorescence Turn-on Sensor for Hg^{2+} and Its Application in Live Cell Imaging

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I. Determination of the Stability Constants[1-2]

The following considerations apply to complexes of stoichiometry 1:2 with a stability constant defined as

$$Ks = \frac{[ML_2]}{[M][L]^2} \quad (1)$$

Fluorescence intensity of the free ligand F_0 is proportional to the concentration C_0

$F_0 = aC_0$ (2)

After addition of a given amount of salt at a concentration C_M, the fluorescence intensity becomes

$F = a[L] + b[ML_2]$ (3)

In addition to this relation, we have

$C_0 = [L] + 2[ML_2]$ (4)

$C_M = [M] + [ML_2]$ (5)

In equation (3) (4) (5), [ML] was omitted because the efficiency of 1:2 complexation of Hg^{2+} with the compound **8H-BDP** is so high and quickly after reaching stoichiometric point, the ligand is fully complexed. F reaches the limiting value.

$$F_{Lim} = b\frac{C_0}{2} \quad (6)$$

From equations 1-6, it is easy to derive the relation

$$x = \frac{F - F_0}{2(F_{Lim} - F_0)}\left\{\frac{1}{Ks}\left[\frac{F_{Lim} - F_0}{C_0(F_{Lim} - F)}\right]^2 + 1\right\} \quad (7)$$

Where x = $[Hg^{2+}]$/[**8H-BDP**], F is the fluorescence intensity for the considered x value, F_0 and C_0 are the initial fluorescence intensity and concentration of **8H-BDP**, respectively, F_{Lim} is the limiting value corresponding to the full complexation. Ks is the stability constant of the $[(Hg^{2+})(\mathbf{8H\text{-}BDP})_2]$ complex.

(1) J. Bourson, J. Pouget and B. Valeur, *J. phys. Chem*., 1993, **97**, 4552;
(2) M. N. Berberan-Santos, P. Choppinet, A. Fedorov, L. Jullien and B. Valeur, *J. Am. Chem. Soc*., 2000, **122**, 11876.

II. Supplementary data

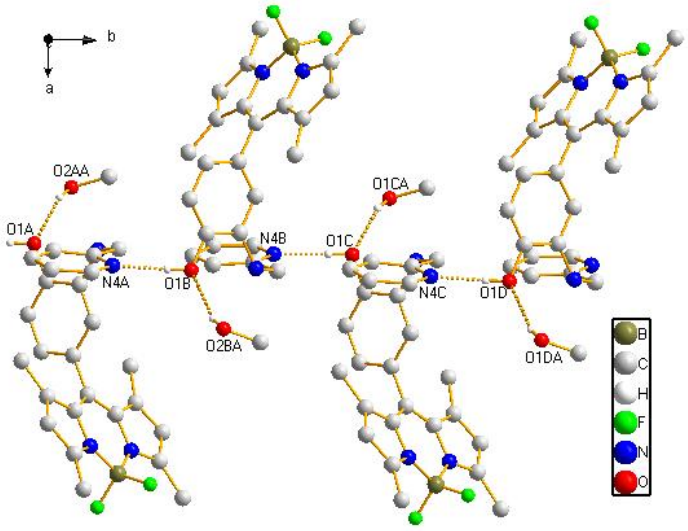

Fig S1. View of the one-dimensional structure formed through the intermolecular hydrogen bonds along *b* direction.

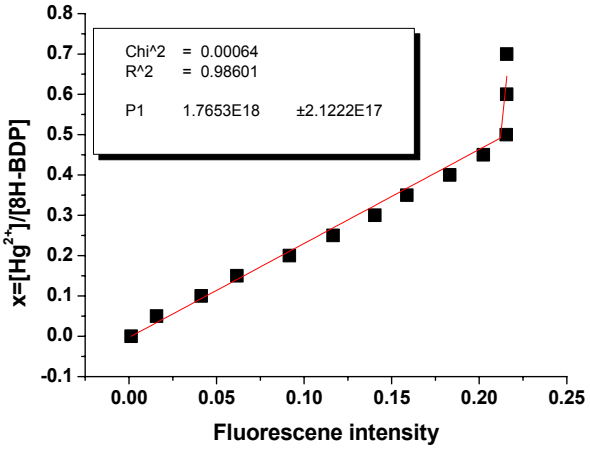

Fig S2. Variations of the ratio x = $[Hg^{2+}]$/[**8H-BDP**] as a function of the fluorescence intensity at 509 nm, the red line corresponds to the best fit with equation 7

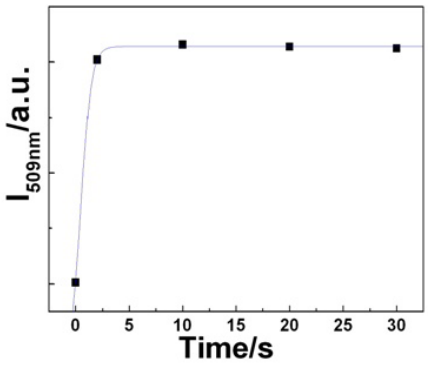

Fig S3. Time course of the fluorescence response of **8H-BDP** (5 μM) to 1 equiv. of Hg^{2+} at 509 nm in DMSO/HEPES buffer (50 mM HEPES, 50mM KNO_3, 1:99, v/v, PH=7.2) solution.

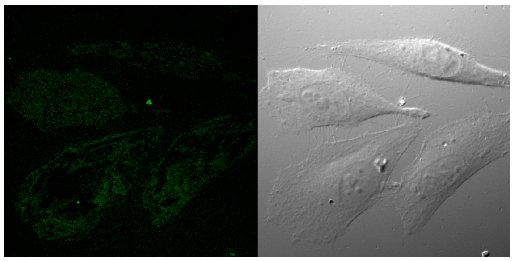

Fig S4. Confocal fluorescence (left) and brightfield (right) images of HeLa cells supplemented with 50 μM Hg^{2+} in the growth media for 1 h at 37°C.

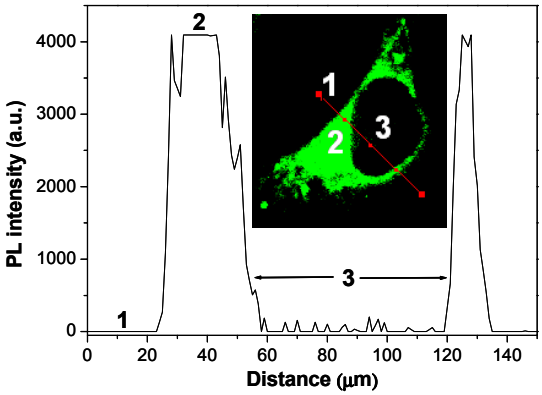

Fig S5. Luminescence intensity profile across the lines shown in confocal luminescence image (inset) of HeLa cells supplemented with 50 μM Hg^{2+} in the growth media for 1 h at 37 °C and then stained with 50 μM **8H-BDP** for 10 min at 25 °C. (λex = 488 nm).

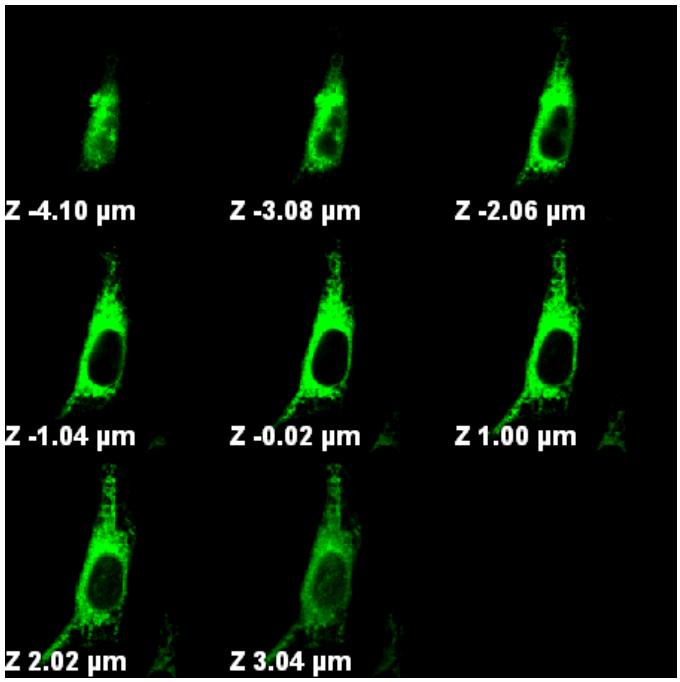

Figure S6. Z-scan confocal fluorescence images of HeLa cells supplemented with 50 µM Hg^{2+} in the growth media for 1 h at 37 °C and then stained with 50 µM **8H-BDP** for 10 min at 25 °C.

III. ^{1}H NMR spectra