

Supporting Information

A “naked-eye” colorimetric and ratiometric fluorescence probe for trace hydrazine

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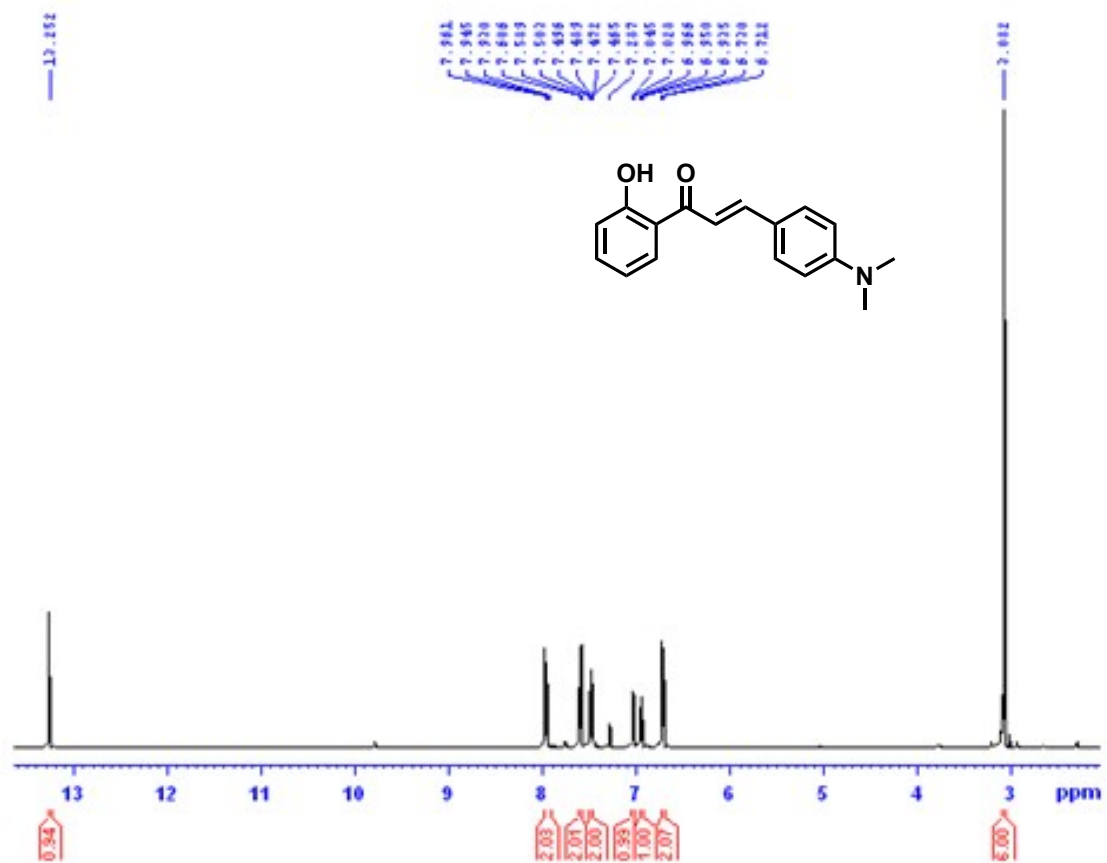


Fig. S1 ¹H NMR spectrum of Probe **DH** (500 MHz, CDCl₃)

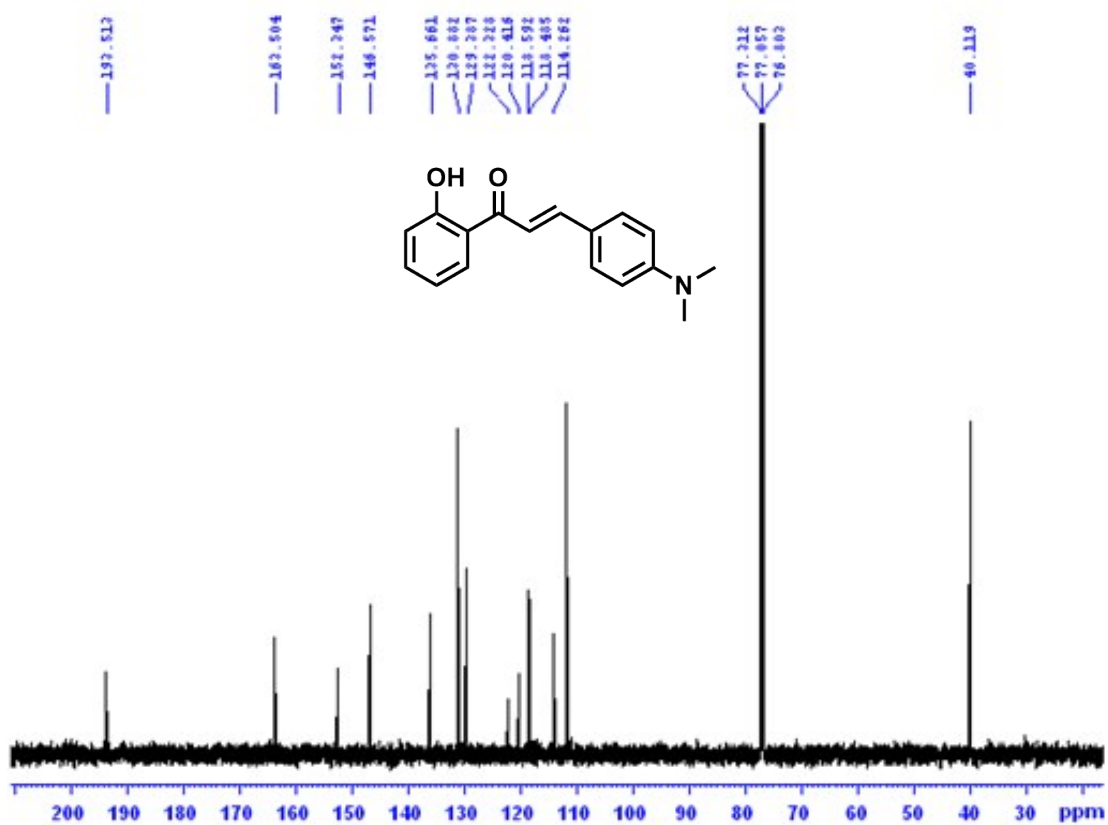


Fig. S2 ¹³C NMR spectrum of Probe **DH** (500 MHz, CDCl₃)

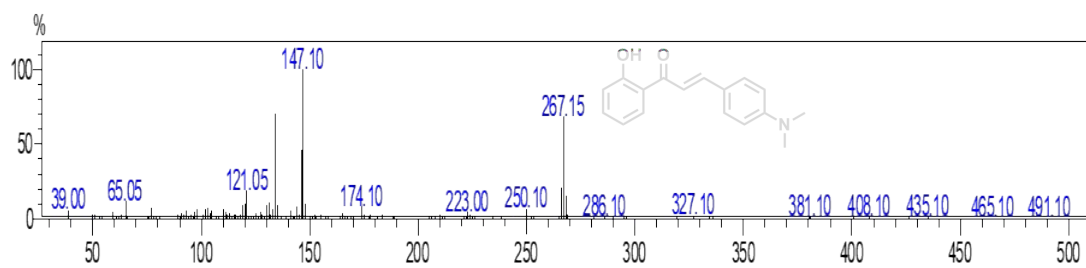


Fig. S3 MS spectrum of **DH**

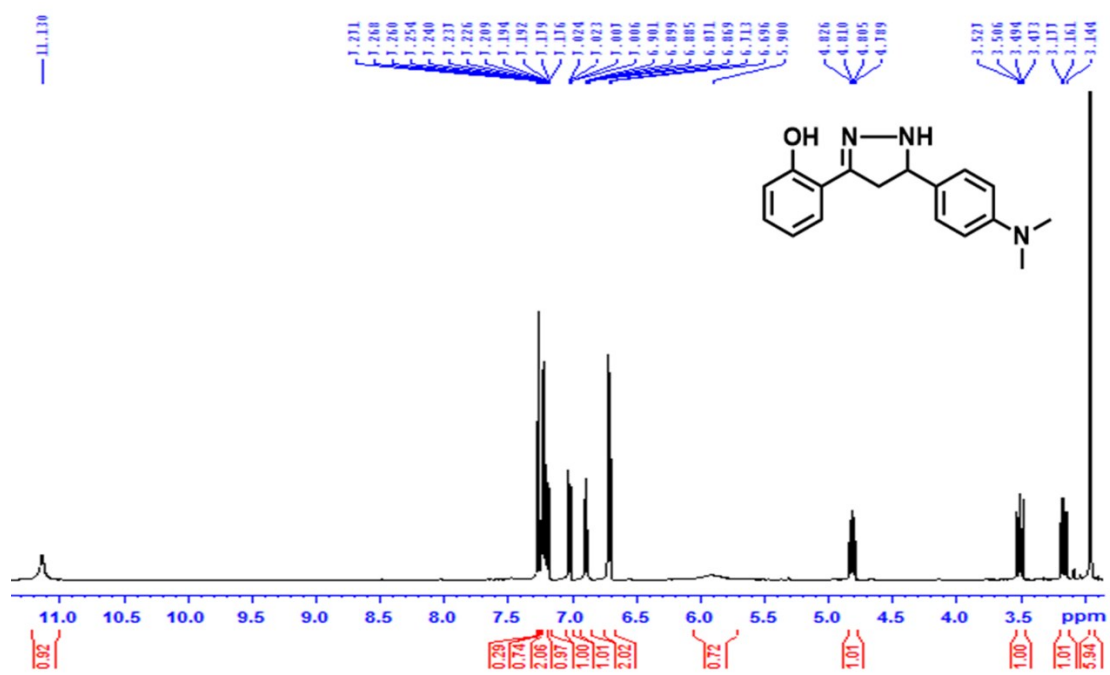


Fig. S4 ¹H NMR spectrum of **DDP** (500 MHz, CDCl₃)

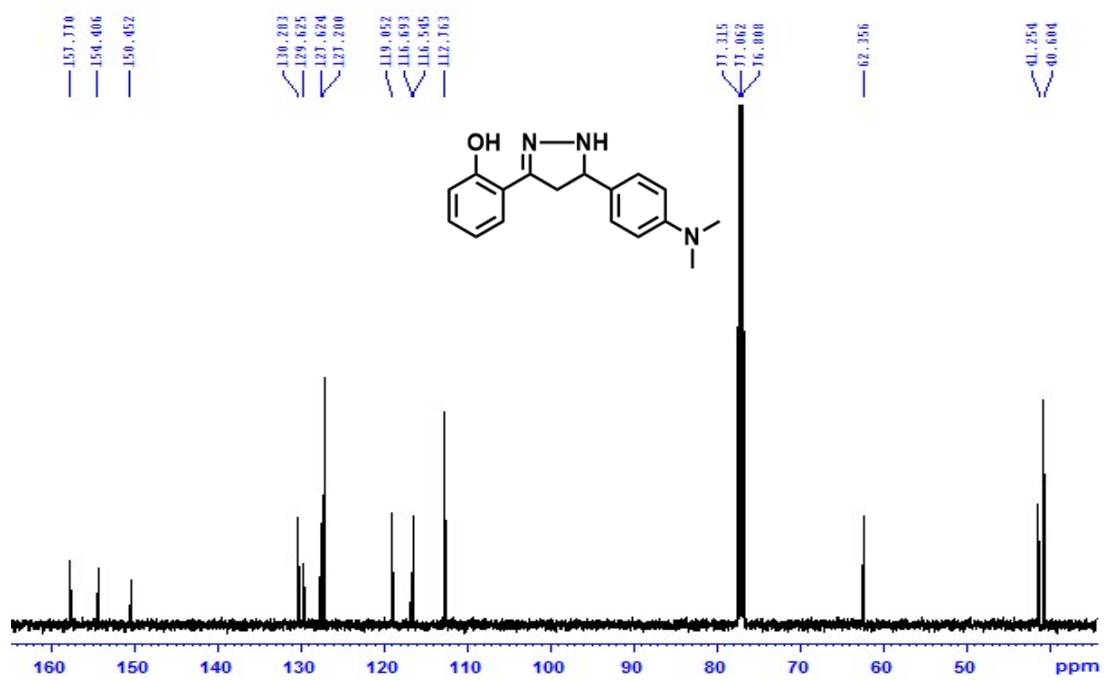


Fig. S5 ¹³C NMR spectrum of DDP (500 MHz, CDCl₃)

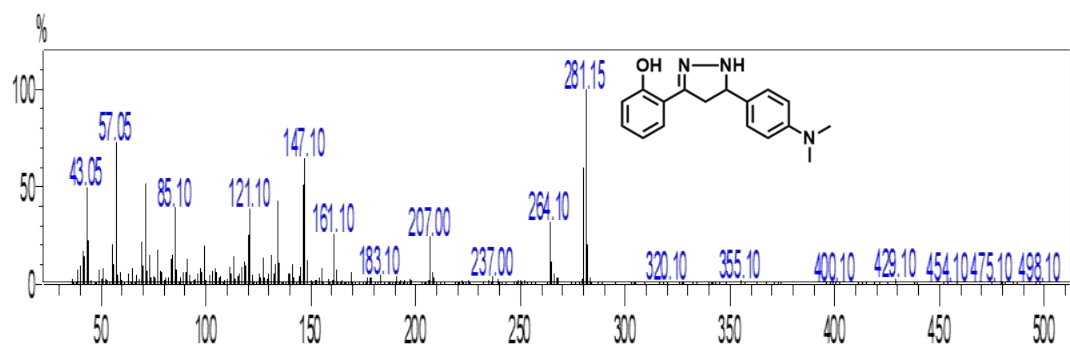


Fig. S6 MS spectrum of probe **DH**+ N₂H₄

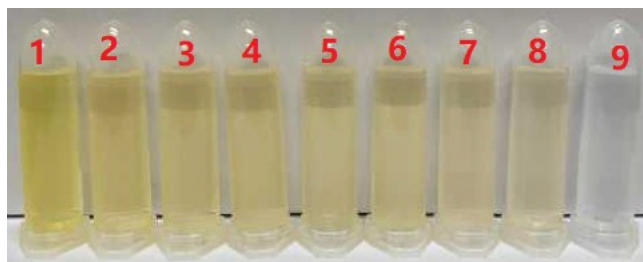
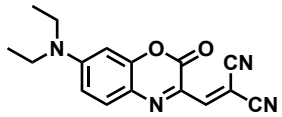
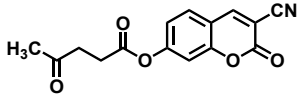
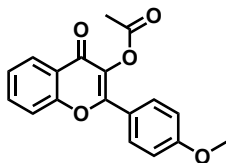
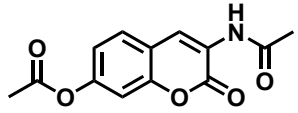
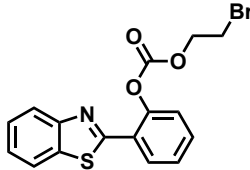
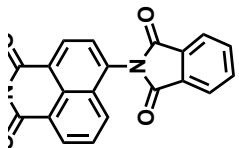

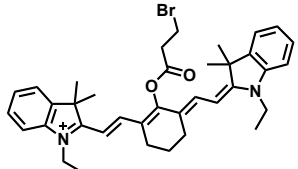
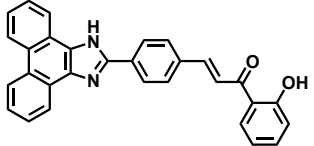


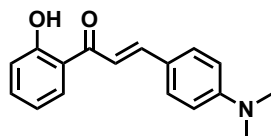
Fig. S7 Photographs of probe **DH** (10 μM) solution in the presence of various concentrations of N_2H_4 (1. 0 μM , 2. 10 μM , 3. 20 μM , 4. 30 μM , 5. 50 μM , 6. 70 μM , 7. 80 μM , 8. 100 μM , 9. 500 μM) in PBS buffer (50% DMSO, pH = 7.4).



Fig. S8 Photographs of probe **DH** (10 μM) solution under 365 nm hand-held UV lamp in the presence of various concentrations of N_2H_4 (1. 0 μM , 2. 10 μM , 3. 20 μM , 4. 30 μM , 5. 50 μM , 6. 70 μM , 7. 80 μM , 8. 100 μM , 9. 500 μM) in PBS buffer (50% DMSO, pH = 7.4).

Table S1 Comparison of the present probe with the reported N₂H₄ fluorescent probe.

| Structure | Detection limit | Practical application | Type of probe | Rf |
|---|--------------------------|------------------------------------|------------------------------|-----------|
|  | 0.70×10^{-9} M | Water samples and cellular imaging | Ratiometric | [1] |
|  | 2.46×10^{-6} M | No | Turn on | [2] |
|  | 10×10^{-6} M | Cellular imaging | Turn on | [3] |
|  | 2×10^{-5} M | No | Ratiometric | [4] |
|  | 0.147×10^{-6} M | Cellular imaging | Turn on | [5] |
|  | 8.8×10^{-9} M | Cellular imaging | Turn on | [6] |
|  | 1.2×10^{-8} M | Cellular imaging | Turn on | [7] |
|  | 7.4×10^{-8} M | Water samples and cellular imaging | Colorimetric and ratiometric | [8] |
|  | 6.3×10^{-8} M | Water samples | Colorimetric and ratiometric | This work |



- [1] J. Fan, W. Sun, M. Hu, J. Cao, G. Cheng, H. Dong, K. Song, Y. Liu, S. Sun, X. Peng, An ICT-based ratiometric probe for hydrazine and its application in live cells, *Chemical Communications* 48(65) (2012) 8117-8119.
- [2] M.G. Choi, J. Hwang, J.O. Moon, J. Sung, S.-K. Chang, Hydrazine-Selective Chromogenic and Fluorogenic Probe Based on Levulinated Coumarin, *Organic Letters* 13(19) (2011) 5260-5263.
- [3] B. Liu, Q. Liu, M. Shah, J. Wang, G. Zhang, Y. Pang, Fluorescence monitor of hydrazine in vivo by selective deprotection of flavonoid, *Sensors and Actuators B: Chemical* 202 (2014) 194-200.
- [4] K. Li, H.R. Xu, K.K. Yu, J.T. Hou, X.Q. Yu, A coumarin-based chromogenic and ratiometric probe for hydrazine, *Analytical Methods* 5(11) (2013) 2653-2656.
- [5] J. Zhou, R. Shi, J. Liu, R. Wang, Y. Xu, X. Qian, An ESIPT-based fluorescent probe for sensitive detection of hydrazine in aqueous solution, *Organic & Biomolecular Chemistry* 13(19) (2015) 5344-5348.
- [6] L. Cui, Z. Peng, C. Ji, J. Huang, D. Huang, J. Ma, S. Zhang, X. Qian, Y. Xu, Hydrazine detection in the gas state and aqueous solution based on the Gabriel mechanism and its imaging in living cells, *Chemical Communications* 50(12) (2014) 1485-1487.
- [7] Z. Lu, W. Fan, X. Shi, Y. Lu, C. Fan, Two Distinctly Separated Emission Colorimetric NIR Fluorescent Probe for Fast Hydrazine Detection in Living Cells and Mice upon Independent Excitations, *Analytical Chemistry* 89(18) (2017) 9918-9925.
- [8] H. Xu, B. Gu, Y. Li, Z. Huang, W. Su, X. Duan, P. Yin, H. Li, S. Yao, A highly selective, colorimetric and ratiometric fluorescent probe for NH_2NH_2 and its bioimaging, *Talanta* 180 (2018) 199-205.