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A highly selective fluorescent probe based on Michael addition for fast detection of hydrogen sulfide

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ABSTRACT: A new 4-hydroxy-1,8-naphthalimide-based compound (probe 1) has been designed and synthesized. The colorimetric and fluorescent properties of probe 1 towards hydrogen sulfide (H₂S) were investigated in detail. The results show that the probe 1 could selectively and sensitively recognize H₂S rather than other reactive sulfur species. The reaction mechanism of this probe is an intramolecular cyclization caused by the Michael addition of H₂S to give 4-hydroxy-1,8-naphthalimide. The intramolecular charge transfer of 4-hydroxy-1,8-naphthalimide is significant. Probe 1 quickly responded to H₂S and showed a 75-fold fluorescence enhancement in 5 minutes. Moreover, probe 1 could detect H₂S quantitatively with a detection limit as low as 0.23 μM.

Keywords: 1,8-Naphthalimide, Fluorescent probe, Hydrogen sulfide, Michael addition.

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