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

Baozhen Gao, Lixia Cui, Yong Pan, Minjie Xue, Boyu Zhu, Guomei Zhang, Caihong Zhang, Shaomin Shuang, Chuan Dong

PII: S1386-1425(16)30576-5
DOI: doi:10.1016/j.saa.2016.09.051
Reference: SAA 14697

To appear in:

Received date: 5 April 2016
Revised date: 24 August 2016
Accepted date: 26 September 2016

Please cite this article as: Baozhen Gao, Lixia Cui, Yong Pan, Minjie Xue, Boyu Zhu, Guomei Zhang, Caihong Zhang, Shaomin Shuang, Chuan Dong, A highly selective fluorescent probe based on Michael addition for fast detection of hydrogen sulfide, (2016), doi:10.1016/j.saa.2016.09.051

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

Baozhen Gao[a], Lixia Cui[a], Yong Pan[b], Minjie Xue[a], Boyu Zhu[a], Guomei Zhang[a], Caihong Zhang[a,*], Shaomin Shuang[a], Chuan Dong[a,*]

[a]*School of Chemistry and Chemical Engineering, Center of Environmental Science and Engineering Research, Shanxi University,Taiyuan 030006,China*

[b]*State Key Laboratory of NBC Protection for Civilian, Research Institute of Chemical Defense, Yangfang, Changping District, Beijing, 102205, China;*

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 (H_2S) were investigated in detail. The results show that the probe 1 could selectively and sensitively recognize H_2S rather than other reactive sulfur species. The reaction mechanism of this probe is an intramolecular cyclization caused by the Michael addition of H_2S to give 4-hydroxy-1,8-naphthalimide. The intramolecular charge transfer of 4-hydroxy-1,8-naphthalimide is significant. Probe 1 quickly responded to H_2S and showed a 75-fold fluorescence enhancement in 5 minutes. Moreover, probe 1 could detect H_2S quantitatively with a detection limit as low as 0.23 μM.

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

[*]Corresponding authors: E-mail: chzhang@sxu.edu.cn (C. Zhang), dc@sxu.edu.cn (C. Dong); Tel: +86 351 7018613; Fax: +86 351 7018613