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A NIR sensor for cyanide detection and its application in cell imaging**Wei-Na Wu^a, Hao Wu^a, Yuan Wang^{a,*}, Xiao-Lei Zhao^a, Zhou-Qing Xu^{a,*},****Zhi-Hong Xu^{b,*}, Yun-Chang Fan^a**^a *College of Chemistry and Chemical Engineering, Henan Key Laboratory of Coal Green Conversion,**Henan Polytechnic University, Jiaozuo 454000, P. R. China*^b *Key Laboratory of Chemo/Biosensing and Detection, School of Chemistry and Chemical Engineering,**Xuchang University, 461000, PR China*

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Abstract:

A novel 'D- π -A' sensor **1** has been designed and prepared via the condensation reaction of 3-ethyl-2-methyl-1,3-benzothiazol-3-ium iodide and 5-nitro-o-vanillin. Upon treatment with cyanide, sensor **1** exhibited a significant near-infrared (NIR) fluorescence quenching at 663 nm. The MS, IR, ¹H NMR and DFT methods confirmed that the response of **1** to cyanide is due to the nucleophilic addition reaction, which results in the inhibition of the Intramolecular Charge Transfer (ICT) process in the sensor. Furthermore, sensor **1** was used for the determination of CN⁻ in HeLa cells.

Keywords: Cyanide (CN⁻); fluorescent sensor; Intramolecular Charge Transfer; near-infrared emission; nucleophilic addition.

1. Introduction

Cyanide is an extremely toxic anion, which can directly lead to the death of organisms [1, 2]. The

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