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The multistage amplifying effect: a novel approach to dramatically increase the sensitivity of chemodosimeter

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Abstract: Through the multistage amplifying effect, a new Hg^{2+} chemodosimeter, 4-(2-(4-nitrobenzyl)-1,3-dithiolan-2-yl)-*N,N*-diphenylaniline, is designed according to a relay strategy, which combines the advantages of two simple reactions: the high selectivity of the Hg^{2+} -promoted deprotection reaction and the obvious color change caused by ketone-enol isomerization. Once triggered by Hg^{2+} , immediate color change from colorless to red purple can be observed in the solution of this chemodosimeter *via* naked-eye without any additional equipment, while other metal ions (Cr^{3+} , Al^{3+} , Fe^{3+} , Co^{2+} , Pb^{2+} , Cu^{2+} , Zn^{2+} , Fe^{2+} , Mg^{2+} , Mn^{2+} , Cd^{2+} , Ba^{2+} , Ca^{2+} , Ni^{2+} , Li^+ , Na^+ , K^+ and Ag^+) give no disturbance to the sensing process. Furthermore, the probe molecule can be easily fabricated as test strips, which can store for a long time with the detection limit as low as $1\ \mu\text{M}$.

Keywords: Multistage amplifying effect, Relay strategy, Mercury Ions, Chemodosimeter, Sensitivity

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