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A mitochondria-targeted near infrared ratiometric fluorescent probe for the detection of sulfite in aqueous and in living cells

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Abstract

A near infrared fluorescent probe YSP for sulfite was synthesized, in which a julolidine fused with a pyran-2-one was employed as the fluorophore and the vinyl activated by an indole salt as the receptor. The introduction of julolidine and indole salt strengthens the electron push-pull effect of the probe and allows it to absorb (597 nm) and emit (681 nm) in red wavelength region. The addition of sulfite to the C=C bond led to prominent blue-shifts in both absorption (171 nm) and emission (165 nm) spectra, which made it possible for colorimetric and ratiometric fluorescent detection of sulfite. NMR titration results illustrated that the determination of sulfite is a two-step process: nucleophilic addition of sulfite to the unsaturated carbon of C=N in indole ring followed by intramolecular rearrangement through a four-membered ring to form adduct-B with shorter absorption wavelength. In addition, the cationic feature of YSP enables the probe to be specifically localized in mitochondria, and it could ratiometric bioimaging sulfite in living HepG-2 and L929 cells.

Graphic Abstract

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