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Title:	Quinoline-tagged fluorescent organic probes for sensing of nitro-phenolic compounds and Zn ²⁺ ions at the ppb level
Authors:	Chakraborty, Gouri (/jspui/browse?type=author&value=Chakraborty%2C+Gouri) Das, Prasenjit (/jspui/browse?type=author&value=Das%2C+Prasenjit) Mandal, Sanjay K. (/jspui/browse?type=author&value=Mandal%2C+Sanjay+K.)
Keywords:	Zn ²⁺ ions Quinoline-tagged
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Abstract:	With variation in the spacer from flexible tetra-methylene to semi-rigid xylene, connecting quinoline chromophores and Lewis basic pyridyl groups on both ends, two new fluorescent sensors, N,N'-bis(pyridin-2-ylmethyl)-N,N'-bis(quinolin-2-ylmethyl)butane-1,4-diamine (bqbpbn, 1) and N,N'-(1,4-phenylenebis(methylene))-bis(1-(pyridin-2-yl)-N-(quinolin-2-ylmethyl)methanamine) (bqbpxn, 2) have been designed and synthesised via simple reduced Schiff base chemistry followed by the nucleophilic substitution reaction under basic conditions in good yields. These were characterized by various analytical techniques, such as FT-IR, UV-vis and NMR (1H and 13C) spectroscopy, and high resolution mass spectrometry (HRMS). The effect due to the change in the spacer was investigated towards the sensing of nitro-phenolic compounds, especially highly explosive 2,4,6-trinitrophenol (TNP) in water with a detection limit of 1.2 ppm and 0.3 ppm in 1 and 2, respectively. The detailed mechanistic studies indicate that photo-induced electron transfer is more dominant in 2 due to the semi-rigid xylene spacer favouring better detection of TNP. Both are potential for on-site TNP detection for practical applications. For this kind of application, the chemical and hydrolytic stability of 1 and 2 were established by powder X-ray diffraction (PXRD) and field-emission scanning electron microscopy (FESEM). The effect of flexible and semi-rigid spacers in these organic probes was further established by metal ion sensing, where 1 and 2 displayed selective sensing of Zn ²⁺ (with the detection limit of 5 and 10 ppb, respectively) via chelation-enhanced fluorescence in aqueous medium with the formation of 1 : 1 and 1 : 2 adducts, respectively.
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