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Pyridoxamine driven selective turn-off detection of picric acid using glutathione stabilized fluorescent copper nanoclusters and its applications with chemically modified cellulose strips

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Abstract

The present work reports the interaction of various vitamin B₆ cofactors with the red emitting glutathione stabilized copper nanoclusters (GSH-CuNCs). Addition of pyridoxamine (PM) resulted a new turn-on band at 410 nm due to the possible adsorption over the surface of GSH-CuNCs. The nano-assembly PM-GSH-CuNCs was applied for the selective detection of nitro-aromatic compounds. Upon addition of picric acid (PA), the fluorescence of PM-GSH-CuNCs was selectively quenched at 410 nm and ~625 nm among the other tested nitro-aromatic compounds. With a linearity range from 9.9 μM to 43 μM , the concentration of PA can be detected down to 2.74 μM . The high selectivity exhibited by the nano-assembly allows to detect PA in real samples like tap water, river water and matchstick. Advantageously, the nano-assembly PM-GSH-CuNCs was chemically adsorbed over the cellulosic strips and applied for the naked-eye detection of PA down to 1 μM .

Keywords: Fluorescent copper nanoclusters; Pyridoxamine; Turn-Off sensor; Picric acid; Chemically-modified cellulose strips.

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