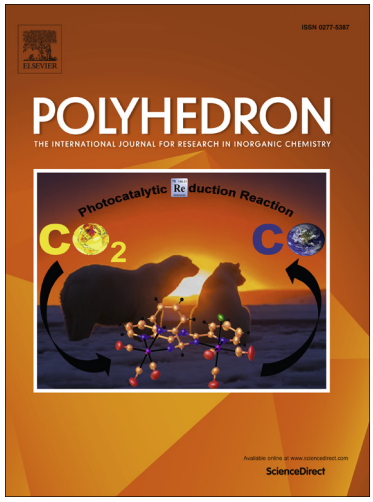

Extending photophysical behavior of Schiff base tripod for the speciation of iron and fabrication of INHIBIT type molecular logic gate for fluorogenic recognition of Zn(II) and Cd(II) ions

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Extending photophysical behavior of Schiff base tripod for the speciation of iron and fabrication of INHIBIT type molecular logic gate for fluorogenic recognition of Zn(II) and Cd(II) ions

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A tripodal Schiff base derived by the condensation of tris(2-aminoethyl)amine and 2-hydroxynaphthalene-1-carboxaldehyde, and characterized by single crystal X-ray diffraction has been explored herein as a chemosensor for metallic species. Although, its fluorogenic response towards Zn^{2+} (in 95:5 ethanol-water solvent) has been already reported, however, its utilization for the naked eye speciation of iron and fluorogenic response towards Cd^{2+} ions needs to be explored. It exhibits pronounced fluorescence signaling for Zn^{2+} and Cd^{2+} as well as chromogenic response towards Fe^{3+}, Fe^{2+}, Zn^{2+} and Cd^{2+} ions. The addition of metallic cations induces a remarkable colorimetric response from yellow to colorless (for Zn^{2+}, Cd^{2+}), purple (for Fe^{2+}) and light green (for Fe^{3+}) visible to naked eye. Interestingly, the sensor can easily differentiate two states of iron (Fe^{3+} from Fe^{2+}) by revealing distinctive colors and different absorption maxima. The detection limit of the sensor towards Zn^{2+}/Cd^{2+} is low down to nanomolar concentration (86 nM and 50 nM, respectively). Moreover, the sensor can be applied for the fabrication of fluorogenic molecular switch, which turns "ON" upon selective binding with Zn^{2+}/Cd^{2+} ions and turns "OFF" in the simultaneous presence of Zn^{2+}/Cd^{2+} and IO_4^- ion. Thus, it is potentially significant sensor and should be explored further for environmental applications.

Keywords

Tripodal ligand, Schiff Base, INHIBIT logic gate, Zn^{2+}, Cd^{2+}, Fe^{2+}, Fe^{3+}, colorimetric sensor, speciation

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