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2-hydroxy-5-methylisophthalaldehyde based fluorescent-colorimetric chemosensor for dual detection of Zn²⁺ and Cu²⁺ with high sensitivity and application in live cell imaging

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Abstract

A 2-hydroxy-5-methylisophthalaldehyde (HMP) based Schiff-base ligand (**HL**) was successfully developed as a fluorescent and colorimetric chemosensor for dual detection of Zn²⁺ and Cu²⁺ ions in HEPES buffer medium (H₂O:Methanol = 9:1 (v/v), pH = 7.4). Interestingly, in presence of Zn²⁺ around 16 times increment in fluorescence intensity and in presence of Cu²⁺ ~174 times decrease in fluorescence intensity has been observed. The 1:2 binding modes for both **HL**-Zn²⁺/Cu²⁺ complexes are proved by fluorescence measurements, ESI-MS analysis and DFT-Calculations. The reversibility and regeneration process of **HL** are also established using Na₂EDTA. It has been observed that Chemosensor **HL** exhibits a rapid change in fluorescence intensity within pH range 6-8 against Zn²⁺ and Cu²⁺ ions. Low detection limit was found to be 1.059×10⁻⁹(M) and 3.53×10⁻⁹ (M) for Zn²⁺ and Cu²⁺ ions respectively, also suggests that the

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