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**Single fluorescein-based probe for selective colorimetric and fluorometric
dual sensing of Al³⁺ and Cu²⁺**

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Highlights

- A method using a single sensor for the detection of both Al³⁺ and Cu²⁺ ions in organo-aqueous solution is developed.
- This probe function as a “turn on” probe for Cu²⁺ and Al³⁺ ions.
- The practical applicability of this probe has been examined in living cells.

ABSTRACT

An efficient fluorescein based probe (H₂L) for the dual sensing of Al³⁺ and Cu²⁺ has been synthesized and characterized. H₂L was highly selective toward these two ions with different fluorescence signals and binding modes in two different media. In EtOH-H₂O (3:2, v/v; pH 4.0), H₂L selectively binds Al³⁺ to form a 1:1 ligand/metal complex, giving rise to a visible pale pink-to-yellow color change and fluorescence enhancement at 440 nm, while in CH₃CN-H₂O (2:3, v/v; pH 7.2), H₂L and Cu²⁺ form a 1:2 ratio complex, resulting in a color change from pink to orange-yellow and a significant fluorescence enhancement at 520nm. The binding modes were confirmed by fluorescence, absorption, IR, ESI-MS and ¹H NMR titrations. The detection limits were calculated to be 7.32×10⁻⁸M and 1.47×10⁻⁸M for Al³⁺ and Cu²⁺, respectively. Cell imaging studies demonstrate that this sensor is capable of sensing Al³⁺ and Cu²⁺ in living cells.

Keywords: Fluorescein; Fluorescence; Colorimetric; Dual sensing

1. Introduction

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