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A highly selective and sensitive fluorescent chemosensor and its application for rapid on-site detection of Al^{3+}

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ABSTRACT

In this paper, a simple naphthalene-based derivative (**HL**) has been designed and synthesized as a Al^{3+} -selective fluorescent chemosensor based on the PET mechanism. **HL** exhibited high selectivity and sensitivity towards Al^{3+} over other commonly coexisting metal ions in ethanol with a detection limit of 2.72 nM. The 1 : 1 binding stoichiometry of the complex (**HL**- Al^{3+}) was determined from the Job's plot based on fluorescence titrations and the ESI-MS spectrum data. Moreover, the binding site of **HL** with Al^{3+} was assured by the ^1H NMR titration experiment. The binding constant (K_a) of the complex (**HL**- Al^{3+}) was calculated to be $5.06 \times 10^4 \text{ M}^{-1}$ according to the Benesi-Hildebrand equation. In addition, the recognizing process of **HL** towards Al^{3+} was chemically reversible by adding Na_2EDTA . Importantly, **HL** could directly and rapidly detect aluminum ion through the filter paper without resorting to additional instrumental analysis.

KEYWORDS: Fluorescent chemosensor; Naphthalene; Aluminum ion;

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