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A Coumarin Based Schiff Base Probe for Selective Fluorescence Detection of Al^{3+} and its Application in Live Cell Imaging

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ABSTRACT:

A new coumarin based Schiff base compound, **CSB-1** has been synthesized to detect metal ion based on the chelation enhanced fluorescence (CHEF). The cation binding properties of **CSB-1** was thoroughly examined in UV-vis and fluorescence spectroscopy. In fluorescence spectroscopy the compound showed high selectivity toward Al^{3+} ion and the Al^{3+} can be quantified in mixed aqueous buffer solution (MeOH: 0.01M HEPES Buffer; 9:1; v/v) at pH 7.4 as well as in BSA media. The fluorescence intensity of **CSB-1** was enhanced by ~ 24 fold after addition of only five equivalents of Al^{3+}. The fluorescence titration of **CSB-1** with Al^{3+} in mixed aqueous buffer afforded a binding constant, $K_a = (1.06 \pm 0.2) \times 10^4\ M^{-1}$. The colour change from light yellow to colourless and the appearance of blue fluorescence, which can be observed by the naked eye, provides a real-time method for Al^{3+} sensing. Further the live cell imaging study indicated that the detection of intracellular Al^{3+} ions are also readily possible in living cell.

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