

## Accepted Manuscript

A new multifunctional benzimidazole tagged coumarin as ratiometric fluorophore for the detection of  $\text{Cd}^{2+}/\text{F}^{-}$  ions and imaging in live cells

Karuppiah Krishnaveni, Murugan Iniya, Dharmaraj Jeyanthi, Ayyanar Siva, Duraisamy Chellappa



PII: S1386-1425(18)30735-2  
DOI: doi:[10.1016/j.saa.2018.07.075](https://doi.org/10.1016/j.saa.2018.07.075)  
Reference: SAA 16344

To appear in: *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*

Received date: 10 April 2018  
Revised date: 25 July 2018  
Accepted date: 26 July 2018

Please cite this article as: Karuppiah Krishnaveni, Murugan Iniya, Dharmaraj Jeyanthi, Ayyanar Siva, Duraisamy Chellappa, A new multifunctional benzimidazole tagged coumarin as ratiometric fluorophore for the detection of  $\text{Cd}^{2+}/\text{F}^{-}$  ions and imaging in live cells. Saa (2018), doi:[10.1016/j.saa.2018.07.075](https://doi.org/10.1016/j.saa.2018.07.075)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# A new multifunctional benzimidazole tagged coumarin as ratiometric fluorophore for the detection of $\text{Cd}^{2+}/\text{F}^-$ ions and imaging in live cells

Karuppiah Krishnaveni<sup>a</sup>, Murugan Iniya<sup>a</sup>, Dharmaraj Jeyanthi<sup>a</sup>, Ayyanar Siva a\* and Duraisamy Chellappa<sup>\*a</sup>

<sup>a</sup>School of Chemistry, Madurai Kamaraj University, Madurai, TamilNadu-625021, India.

\*Corresponding author. Tel: +91 452 2456614; Fax: +91 452 2459181.

E-mail address: dcmku123@gmail.com, drasiva@gmail.com

## ABSTRACT

A novel multifunctional ratiometric fluorescent probe has been designed and synthesized for the selective recognition of  $\text{Cd}^{2+}/\text{F}^-$  ions. The probe (3)-((2)-(1H-benzimidazole-2-yl)-phenylimino) methyl-4-chloromethyl-2H-chromen-2-ene (**BIMC**) displays excellent ratiometric responses towards  $\text{Cd}^{2+}/\text{F}^-$  ions over the tested cations/anions. The lowest detection limits observed for  $\text{Cd}^{2+}$  and  $\text{F}^-$  are  $1.5 \times 10^{-10}$  mol/L and  $1.2 \times 10^{-10}$  mol/L respectively. Job's plot and Electro spray Ionization mass spectral (ESI-MS) studies confirms 1:1 binding stoichiometry of **BIMC** with  $\text{Cd}^{2+}/\text{F}^-$  ions, which is further evidenced by <sup>1</sup>H-NMR titration studies. The reversibility studies of **BIMC** with  $\text{Cd}^{2+}$  have been investigated using ethylenediaminetetraacetic acid (EDTA). Upon binding to  $\text{Cd}^{2+}/\text{F}^-$  ions, the probe features strong ratiometric response in both UV-Visible and fluorescence spectra due to the inhibition of intramolecular charge transfer (ICT). Furthermore, the mechanism of ICT has been rationalized via solvatochromism and DFT calculations.

## 1. Introduction

The widespread occurrence of heavy metals and anions in both industry and agriculture wastes causes harmful effects on human health and are recognized as eco-pollutants [1]. Chemosensors have the potential to detect various ion and neutral species due to their high sensitivity, selectivity, versatility and relatively simple handling. Hence nurturing multifunctional receptors have become more attractive and also gained much more importance in recent era of research due to their ecological potentials [2–4]. However, only few receptors are available in the literature for simultaneous detection of multianalytes with different optical responses [5–7].

Download English Version:

<https://daneshyari.com/en/article/7667249>

Download Persian Version:

<https://daneshyari.com/article/7667249>

[Daneshyari.com](https://daneshyari.com)