Government of West Bengal
Office of the Principal
GOVERNMENT GENERAL DEGREE COLLEGE, MANGALKOTE
PANCHANANTALA, KHUDRUN DIGHI, MANGALKOTE
P.O. - MAJHIGRAM; BLOCK - MANGALKOTE; SUB DIVISION - KATWA
DISTRICT - PURBA BARDHAMAN; WEST BENGAL; PIN CODE - 713132; INDIA
Email: ggdcmangalkote@gmail.com; Website: https://mangalkotegovtcollege.org

सत्यमेव जयते

Memo No.: 28 /MGC **Dated: 11/01/2022**

To Whom It May Concern

This is to certify that Dr. Dinesh Maity, Assistant Professor of Chemistry at Government General Degree College, Mangalkote, is doing collaborative research with Dr. Partha Roy, Professor in the Department of Chemistry at Jadavpur University from 2022. This collaboration will yield significant scientific advancements, facilitating a productive relationship between the two institutions.

Their collaborative effort will create several opportunities for publications in the field of "Fluorescent Chemosensors".

It is expected that their collaboration will remain as dynamic, resulting in several successful publications in prestigious science journals.

Government General Degree College * Mangalkote *

Dr. Pradipta Kumar Basu
Officer-In-Charge
Government General Degree College, Mangalkote

OFFICER IN CHARGE, W.B.E.S.
Government General Degree College, Mangalkote
Dt. Purba Bardhaman, West Bengal- 713132

Dr. Pradipta Kumar Basu
OFFICER IN CHARGE, W.B.E.S.
Government General Degree College, Mangalkote
Dt. Purba Bardhaman, West Bengal- 713132

যাদবপুর বিশ্ববিদ্যালয়
কলকাতা-৭০০ ০৩২, ভারত

*JADAVPUR UNIVERSITY
KOLKATA-700032, INDIA

FACULTY OF SCIENCE : DEPARTMENT OF CHEMISTRY : INORGANIC SECTION

Date: 11/01/2022

To Whom It May Concern

On behalf of my research group, Department of Chemistry, Jadavpur University, Kolkata 700032, West Bengal, India; I am extremely happy to say that I am willing to do advance research work in the field of "Fluorescent Chemosensors" with Dr. Dinesh Maity, Assistant Professor of Chemistry at Government General Degree College, Mangalkote.

This collaboration will yield significant scientific advancements, facilitating a productive relationship between the two institutions.

Partha Roy

Dr. Partha Roy
Professor
Department of Chemistry
Jadavpur University
Kolkata-700 032, India

Professor Partha Roy
Department of Chemistry
Jadavpur University
Kolkata - 700032

Basu

Dr. Pradipta Kumar Basu
OFFICER IN CHARGE, W.B.E.S.
Government General Degree College, Mangalkote
Dt. Purba Bardhaman, West Bengal- 713132

Contents lists available at ScienceDirect

Inorganic Chemistry Communications

journal homepage: www.elsevier.com/locate/inoche

ELSEVIER

Short communication

Turning a fluorescent probe for Al^{3+} into a pH sensor by introducing Cl-substitution

Dinesh Maity [a], Sibshankar Bari [a], Pritam Ghosh [b], Partha Roy [a,*]

[a] Department of Chemistry, Jadavpur University, Jadavpur, Kolkata 700032, India
[b] Institut für Chemie, Humboldt-Universität zu Berlin, Brook-Taylor-Straße 2, 12489 Berlin, Germany

ARTICLE INFO

Keywords:
Schiff-base
Fluorescence probe
Colorimetric
pH sensor

ABSTRACT

Here we report a new Schiff-base molecule, 4,4′-sulfonylbis(2-(5-chloro-2- hydroxybenzylideneamino)phenol) (**H_4L^{Cl}**) as a colorimetric and fluorescent probe for pH. On increase in pH from 2.0 to 12.0, the fluorescence intensity of **H_4L^{Cl}** increases by 45-fold at 509 nm in Britton-Robinson buffer (λ_{ex} = 380 nm). Quantum yield of the probe also increases on increase in pH of the media. This enhancement of fluorescence intensity is mainly due to the deprotonation of the phenolic OH groups in the sensor molecule. The pK_a of the probe has been determined to be 7.18. Theoritical studies show that the increment in intensity occurs via ICT-AIE controlled pathway. Naked eye detection is possible by noting the color change of the solutions observed under visible and UV light. Several cations and anions do not interfere in the pH sensing properties of **H_4L^{Cl}**. It is to mention that the compound without Cl-substituion, namely, 4,4′-sulfonylbis(2-(-2-hydroxybenzylideneamino)phenol), was reported earlier as a chemosensor for Al^{3+} ion (New J. Chem. 41 (2017) 10677). Introduction of Cl changes sensing preference of the Schiff-base from Al^{3+} to pH. **H_4L^{Cl}** has been used for pH detection of river water.

1. Introduction

It is well known that several biological transformations, which occur at a particular pH, frequently involve protonation and deprotonation of biomolecules, and alteration in pH may hamper the processes. So, extracellular and intracellular pH detection is of great importance because of its connection with biological processes like cell growth, endocytosis, ion transport, etc. [1–4]. pH is the negative logarithm of $[H^+]$ (pH = $-\log[H^+]$). It is an important parameter employed in many areas of research such as chemical, environmental and medical sciences, and industries as well [5–9]. Water is one of the basic needs for all living organisms. World Health Organization (WHO) recommends that pH of drinking water should be in the range of 6.5–8.5 [10,11]. If the pH of the water is altered, it can affect greatly *in vivo* functions and different activities in the human body [12]. In recent years, rapid urbanization, development of industries, household activities, acid rain, and huge plastic uses are causing water pollution which in turn changes the pH of the water [13,14]. Thus, pH plays a key role in monitoring the quality of water.

Generally, potentiometric pH glass electrodes are applied to determine the pH in laboratory. Although this technique is successful to measure pH but has several limitations such as frequent calibration, electrical interference, etc. Moreover, this technique could not be employed during intracellular pH measurements [5,15,16]. On the contrary, optical-based fluorescent pH sensors have no such shortcomings. In addition, fluorescent pH sensors have drawn special interest to researchers because of their high sensitivity, selectivity, ease to handle, low cost, and harmless applications in living cells, etc. [17]. In recent years, great efforts have been devoted to the development of efficient fluorescent chemosensors for the detection of pH in environmental samples [18–22]. Different fluorophoric platforms such as rhodamine, 4-methyl-2,6-diformylphenol (DFP), etc. have been used to develop chemosensors for pH [23–25]. We have been working on the development of fluorescent sensors including probes for pH based on DFP for quite a time [26–30]. It has been learnt that substitution(s) on aromatic ring or increase in decolalization by introducing aromatic ring(s) has significant effect on pH sensing properties. However, the design of efficient fluorescent probes for monitoring pH has remained challenging for real samples. Till date, only few fluorescent probes containing sulfone moiety have been reported for various ions [31,32]. But reports on pH sensors containing sulfone moiety are rare.

In this context, here we report the synthesis, characterization and pH

* Corresponding author.
E-mail address: partha.roy@jadavpuruniversity.in (P. Roy).

https://doi.org/10.1016/j.inoche.2022.109822
Received 23 June 2022; Received in revised form 12 July 2022; Accepted 28 July 2022
Available online 1 August 2022
1387-7003/