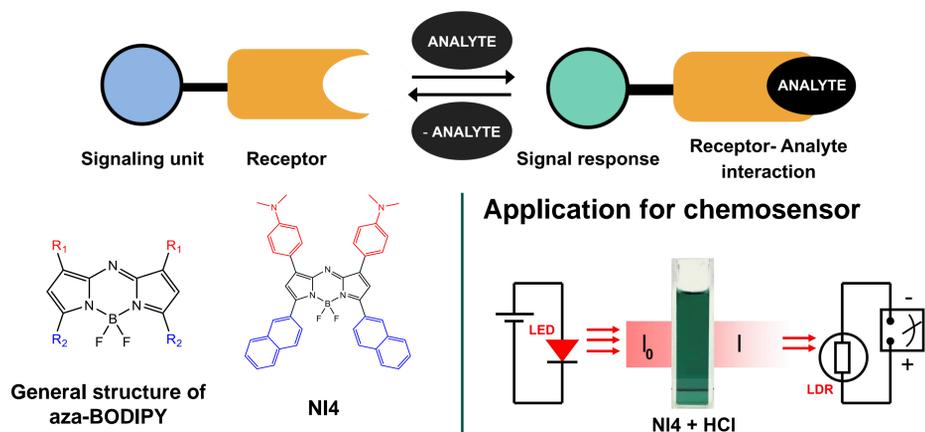


## Abstract

In this research, the investigation of aza-boron dipyrromethene (aza-BODIPY) and its chemosensor properties for selective ion detection was performed. The synthesis of aza-BODIPY compound **NI4**, which contains two dimethylaniline as well as two naphthyl groups, was carried out successfully. The **NI4** solution exhibited absorbance at 624 nm. Upon the addition of hydrochloric acid solution, the color change and the appearance of a new absorption band were observed at 677 nm. The color change from blue to green could be easily observed by naked eyes. This change could be due to the inhibition of charge transfer between the dimethylaniline groups and the aza-BODIPY core. To verify this hypothesis, various spectroscopic techniques were employed, including UV-Visible spectroscopy, <sup>1</sup>H-NMR, and FTIR. Additionally, the custom-built Arduino-based colorimeter was developed and used to measure hydrochloric acid concentration based on the color change of the solution. The results were then compared with those obtained from a UV-Vis spectrophotometer. The limit of detection (LOD) for the UV-Vis spectrophotometer was found to be 0.40 μM, while the LOD for the colorimeter was 11.23 μM. The compound **NI4** along with custom-built colorimeter demonstrated potential as a test kit prototype for H<sup>+</sup> detection.



## Introduction

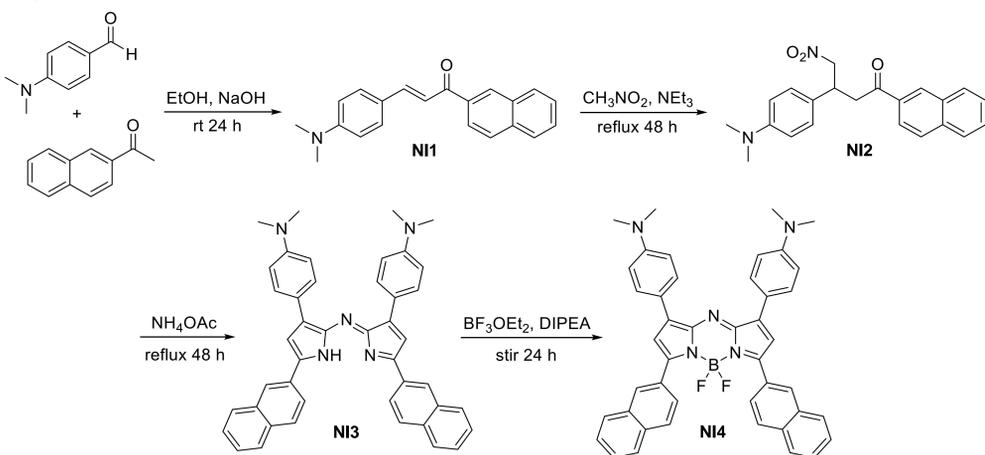


## Objectives

1. To synthesize a derivative of aza-boron dipyrromethene (aza-BODIPY)
2. To study for chemosensor properties of the synthesized aza-BODIPY

## Methods

### Synthesis of NI4



### Purification

- Column chromatography

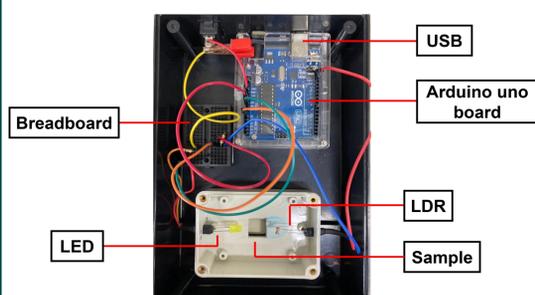
### Characterizations

- <sup>1</sup>H-NMR
- FTIR

### Colorimetric responses studies

- Selectivity
- Spectrophotometric titration
- Limit of detection (LOD)

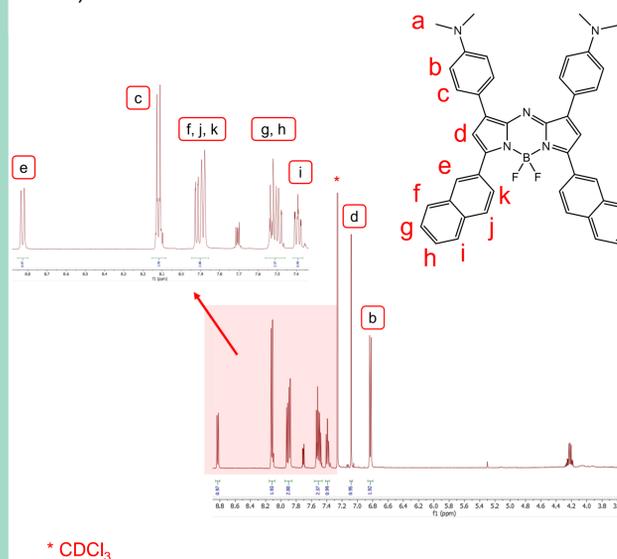
### Application with custom-built colorimeter



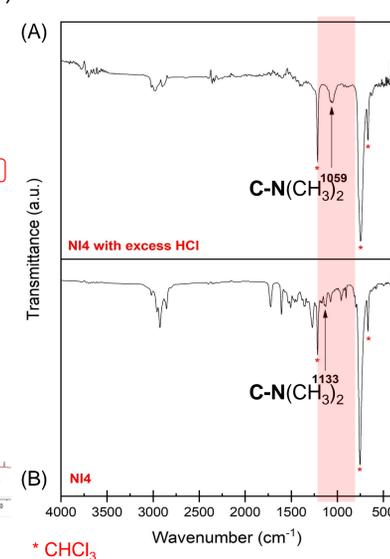
## Results & Discussion

### Characterizations

#### 1) <sup>1</sup>H-NMR



#### 2) FTIR



\* CDCl<sub>3</sub>

\* CHCl<sub>3</sub>

Fig 1. (1) <sup>1</sup>H-NMR spectrum of **NI4** in CDCl<sub>3</sub> (2A) FTIR spectrum of **NI4** with excess HCl (2B) FTIR spectrum of **NI4**.

### Colorimetric responses studies

- Selectivity test

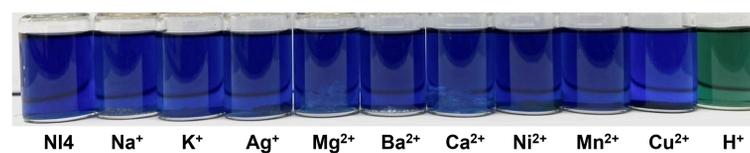


Fig 2. The mixture of **NI4** and various cations in CDCl<sub>3</sub>.

- Spectrophotometric titration

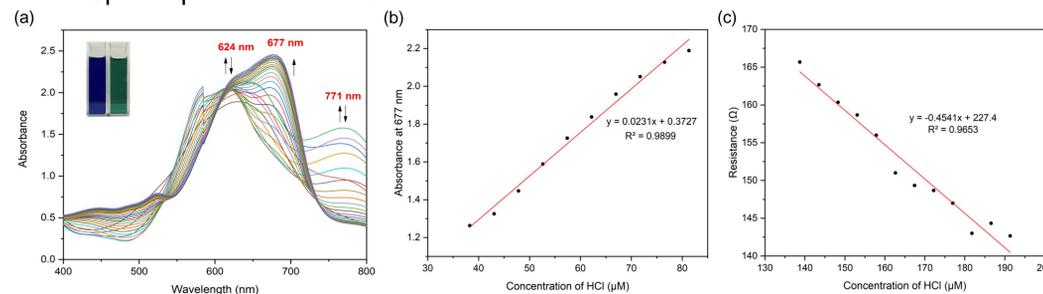


Fig 3. (a) UV-Vis spectrum of **NI4** titrated with HCl (b) The calibration graph between [H<sup>+</sup>] and the absorbance (λ<sub>677</sub>) for **NI4** (c) The calibration graph between [H<sup>+</sup>] and the resistance for **NI4**.

## Conclusions

- The **NI4** has been successfully synthesized.
- The **NI4** can selectively interact with H<sup>+</sup> from HCl and change the color from blue to green.
- The LOD obtained from the UV-Vis spectrophotometer and custom-built are 0.40 and 11.23 μM, respectively.
- The **NI4** along with custom-built colorimeter demonstrated potential as a test kit prototype for H<sup>+</sup> detection.

## Acknowledgement

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## Reference

Luangphai, S., Thuptimdang, P., Buddhiranon, S., & Chanawanno, K. (2024). Aza-BODIPY-based logic gate chemosensors and their applications. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, 322, 124806.