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# A BODIPY derivative for colorimetric fluorescence sensing of Hg<sup>2+</sup>, Pb<sup>2+</sup> and Cu<sup>2+</sup> ions and its application in logic gates

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## ABSTRACT

A BODIPY-based colorimetric and fluorescent chemosensor **1** anchored with dipyritylamino (DPA) receptor has been designed, synthesized and characterized. It exhibited a simultaneous sensitive recognition for Cu<sup>2+</sup>, Hg<sup>2+</sup> and Pb<sup>2+</sup> ions. With the addition of these three kinds of metal ions into **1** in CH<sub>3</sub>CN, its initial absorption maximum displayed obvious blue shifts, and the color changes of the solution could be clearly observed by naked eyes. Besides, the fluorescence intensity was significantly enhanced accompanied with the appearance of new emission peaks at 587 nm for Pb<sup>2+</sup> and Hg<sup>2+</sup> ions and 545 nm for Cu<sup>2+</sup> ions. These results were attributed to the  $\pi$ -deconjugation between N-pyridyl and the BODIPY group due to the binding of metal ions with the BODIPY and DPA groups. Based on the sensing behaviors of **1**, three logic gates (OR, INHIBT and combinational logic gate) were constructed correspondingly.

**Keywords:** BODIPY; Mercury (II) ion; Lead (II) ion; Copper (II) ion; Fluorescent chemosensor; Logic gates.

## 1. Introduction

Copper is one of the most important trace elements for humans, but the excess of

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