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Fluorescent Probes for Chloride ions in Biological Samples

Fengyuan Zhang[a,b], Chen Ma[a], Yaya Wang[a], Wei Liu[a], Xiaoyan Liu [a]*, Haixia Zhang[a]*

[a]College of Chemistry and Chemical Engineering, Lanzhou University, Lanzhou 730000, China

[b]School of Basic Medical Science, Ningxia Medical University, Yinchuan 750004, China

* Corresponding author Tel.: +86 931 8912058; fax: +86 931 8912582;

E-mail: zhanghx@lzu.edu.cn

Abstract As one of the most widespread anions, chloride ion largely existed in the water sources as well as living organism. Therefore, determination of chloride ions in biological samples is evidently important. Herein, we developed two analogous fluorescence probes BeQ1 and BeQ2 for the sensitive detection of chloride ions. The chloride ions in biological samples were determined by a direct and simple method with the detection limit of 46 and 66 μM respectively. In addition, the probes were found having the two-photon excitation property.

Keywords: Fluorescent probe; Chloride ions; Two-photon absorption; Biological samples

1. Introduction

Anions exist widely in the environment, industry and in biosystem, where phosphate, carbonate and chloride are the most common ions. Chloride ion is the most abundant physiological anion and participates in various physiological process including the control of membrane potential, pH and regulation of cell volume [1-4]. Abnormal of chloride level in body fluid leads to many diseases such as cystic fibrosis, myotonia, bartter syndrome and startle disease [5-7]. For example, cystic fibrosis (CF) is a disease containing high chloride concentration in a patient's sweat, typically greater than 60 mM, and the normal value is lower than 40 mM for the healthy people [8]. The accurate determination of chloride concentrations in human serum and human sweat samples is evidently helpful for diagnosis.

Chloride anions can be detected with many analytical methods, including ion chromatographic [9-10], electrochemical [11-14] and spectrophotometric methods [15]. The use of sensitive fluorescent sensors is a convenient approach providing a