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PII: S0039-9140(16)30840-2
DOI: http://dx.doi.org/10.1016/j.talanta.2016.10.091
Reference: TAL17011

To appear in: *Talanta*

Received date: 14 July 2016
Revised date: 13 October 2016
Accepted date: 23 October 2016

Cite this article as: Fang Gao, Shiyao Ma, Xincai Xiao, Yan Hu, Dan Zhao and Zhike He, Sensing Tyrosine Enantiomers by Using Chiral CdSe/CdS Quantum Dots Capped with N-Acetyl-L-Cysteine, *Talanta* http://dx.doi.org/10.1016/j.talanta.2016.10.091

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Keywords: Chiral recognition, Tyrosine, Quantum dots, Circular dichroism, N-acetyl-L-cysteine

ABSTRACT: Despite of the importance of enantiomers, the fluorescence sensing of enantiomers and the interpretation of the "preferential interaction" still remain insufficiently explored. In this study, we report the recognition of tyrosine (Tyr) enantiomers by chiral N-acetyl-L-cysteine (L-NAC) capped CdSe/CdS quantum dots (QDs) under alkaline experimental condition. L-Tyr could greatly quench the fluorescence of CdSe/CdS QDs, while D-Tyr displayed no effect on the fluorescence. The one-step synthesized chiral L-NAC-CdSe/CdS QDs demonstrated high selectivity for Tyr enantiomers. In particular, the mechanism of chiral recognition has been studied by UV/vis absorption spectra and circular dichroism (CD) spectra. The changes of intensity and sign of CD spectra corroborated the attachment of L-Tyr to the surface of QDs, which may be valuable aids in obtaining a better understanding of the possible mechanism of enantioselective recognition.

1. Introduction

Chirality is widespread throughout nature. Most biologically active compounds (amino acids, sugars, peptides, proteins, DNA, etc.) and modern drugs are chiral. The ability to recognize and quantify enantiomeric forms of chiral molecules is of great importance in chemical, biological and pharmaceutical sciences [1]. Currently, the approaches of analysis of chiral molecules mainly depend on high-performance liquid chromatography, capillary electrophoresis, and gas chromatography [2-4]. However, these methods are usually of high cost and time-consuming due to their requirements for sophisticated instrumentations, expensive chiral columns and relatively long analysis times. Consequently, it is extremely essential for chemists to develop inexpensive and more convenient techniques to perform chiral recognition as well as the quantification of chiral molecules [5-7].

Fluorescence spectroscopic techniques have aroused significant interests of researchers due to their low cost, simplicity, high sensitivity, and diverse signal output modes [8]. The key to achieving chiral discrimination between the enantiomer molecules is chiral selector with fluorescence-signaling modes.