# Preparation and application of aptamer-modified water soluble quantum dots for detection of pathogens

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Rapid, selective and sensitive detection of pathogens is essential for medical technology, disease control and food safety. Traditional methods for pathogen detection are polymerase chain reaction (PCR), fluorescence-based assays, culture and colony counting. In this context, biosensors offer several advantages like high-throughput screening, improved detectability, label-free detection, real-time analysis over existing techniques [1]. Various types of biological molecules such as enzymes, microorganisms, antibodies and DNA can be used to fabricate biosensors. Among of them antibodies and newly aptamers has been great attention to construct pathogen detection technologies. Antibody-based sensors permit the rapid and sensitive analysis of a range of pathogens and associated toxins [2]. Aptamers are short oligonucleotides that are capable to selectively bind their corresponding target. Therefore, they can be thought of as nucleic acid-based alternative to antibodies. The design of aptamers is simple and takes short time, however antibodies are expensive and their preparation takes long time.

Herein, we report the design aptamer-modified quantum dot conjugates for detection of microbial pathogens. To perform active pathogen binding, thioglycolic acid coated quantum dots were modified with amino functional specific aptamer via EDC/NHS method. Fluorescence spectra, TEM, hydrodynamic light scattering and agarose gel electrophoresis studies show that the synthesized aptamer-quantum dot nanoconjugates were conjugated successfully. To achieve detection of microbial pathogens, electrochemical biosensor systems will be constructed and selected pathogen microorganism *Escherichia coli* O157:H7 will be determined with constructed nanoconjugate immobilized system.

(1) Sanvicens, N.; Pastells, C.; Pascual, N.; Marco, M.-Pilar; *Trac-Trend. Anal. Chem.* 2009,**28**, 11.

(2) Byrne, B.; Stack, E.; Gilmartin, N.; O'Kennedy, R.; *Sensors* 2009,**9**, 4407.