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Aptamer based *E-coli* detection in waste waters by SWCNTs modified biosensor system

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Waste waters are monitored worldwide to protect people from infectious diseases primarily caused by enteric pathogens. All long, *E coli* is a good indicator for potential enteric pathogens in waters. Thus a rapid and simple detection method for *E coli* is very important to predict the pathogen contamination.Here, a simple and highly sensitive aptamer-based single walled carbon nanotubes (SWNTs) biosensor containing probe-DNA (complementary of *E coli* aptamer) immobilized on functionalized SWNTs will be presented. In this SWCNTs based *E coli* biosensor a specific *E coli* aptamer, which can specifically distinguish the *E coli* O157:H7 strain from other pathogens was used. Employing simple directed assembly and non-covalent functionalization process these fabricated probe DNA-based SWNTs biosensors were designed with two electrode terminals to allow continuous resistance response monitoring for the E-coli detection. The detection procedure is based on competitive mode detection. A known concentration of aptamer and *E coli* were mixed and after a certain time filtered. The rest of free aptamers injected to the system. With hybridization of the free aptamers and their SWCNTs surface immobilized complementary DNA (probe-DNA), we can monitor the resistance difference which is proportional to the amount of the *E coli*. Thus, we can detect the *E coli* without injecting it directly onto the sensing surface and we could protect the electrode surface from the aggregation of target bacteria or other pollutants that may come from real waste water samples.After optimization experiments, the linear detection range was determined from 1 to 105cfu/ml with higher than 0.98 R2 value. The system was regenerated successfully with 5% SDS solution over 100 times without any significant deterioration of the sensor performance. The developed system had high specificity towards *E coli* (less than 20% signal with other pathogens) and it could be applied to real waste water samples with 86 to 101% recovery and 3 to 18% cv values (n=3).

Biography

Nimet Yildirim is a fourth year PhD student at Northeastern University, Bioengineering Department under the supervision of Prof. April Gu from Civil and Environmental Engineering Department. She is working on “New generation biosensor systems for environmental waste water analysis” project. She is working on some different detection systems such as optical detection systems; CNTs modified electrical system and SPRi detection system. She has already published 2 journal papers, 2 conference proceedings and 2 posters related to her dissertation and submitted 5 other journal papers.

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