

Development of highly sensitive electrochemical genosensor based on multi-walled carbon nanotubes-chitosan-bismuth and lead sulfide nanoparticles for the detection of pathogenic *Aeromonas*

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In this paper, we reported the construction of new high sensitive electrochemical genosensor based on multi-walled carbon nanotubes-chitosan-bismuth complex (MWCNT-Chi-Bi) and lead sulfide nanoparticles for the detection of pathogenic *Aeromonas*. Lead sulfide nanoparticles capped with 5-(NH₂) oligonucleotides through amide bond was used as signaling probe DNA (sz-DNA) and thiol-modified oligonucleotides sequence was used as fixing probe DNA (fDNA). The two probes hybridize with target *Aeromonas* DNA (tDNA) sequence (fDNA-tDNA-szDNA). The signal of hybridization is detected by differential pulse voltammetry (DPV) after electro deposition of released lead nanoparticles (PbS) from sz-DNA on the surface of glass carbon electrode decorated with MWCNT-Chi-Bi which improves the deposition and transducing electrical signal. A new ssDNA probe and primers specific for the fragment *Aerolysin* gene (*aer*) was designed and the optimization of incubation time, hybridization temperature, deposition potential, deposition time and the specificity of the probes were investigated. Our results showed the highest sensibility to detect the target gene when compared with related biosensors and Polymerase Chain Reaction (PCR). The detection limit for this biosensor was 10⁻¹⁴ M. We could detect lower than 10²CFU mL⁻¹ of *Aeromonas* in tap water. This method is rapid and sensitive for the detection of pathogenic bacteria and would become a potential application in biomedical diagnosis, food safety and environmental monitoring.

Biography

Antonio Maximiano Fernandes has completed his MSc at the age of 28 years from Jiangnan University. He is Medical Pathologist and Food Scientist Researcher, developing the first real application of highly sensitive genosensor which has several applications. The main advantage of this research is the superior sensibility application of nanomaterial in real samples detection. Recently he planned to combine electronics and real time samples detection and papers has been accepted in high reputed journals such as Biosensor and Bioelectronic (UK) and Journal of Agriculture and Food Chemistry (USA).

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