

## **A simple, portable, electrochemical biosensor to screen shellfish for vibrio parahaemolyticus**

### **ABSTRACT**

An earlier electrochemical mechanism of DNA detection was adapted and specified for the detection of *Vibrio parahaemolyticus* in real samples. The reader, based on a screen printed carbon electrode, was modified with polylactide-stabilized gold nanoparticles and methylene blue was employed as the redox indicator. Detection was assessed using a microprocessor to measure current response under controlled potential. The fabricated sensor was able to specifically distinguish complementary, non-complementary and mismatched oligonucleotides. DNA was measured in the range of  $2.0 \times 10^{-8}$ – $2.0 \times 10^{-13}$  M with a detection limit of 2.16 pM. The relative standard deviation for 6 replications of differential pulse voltammetry (DPV) measurement of 0.2  $\mu$ M complementary DNA was 4.33%. Additionally, cross-reactivity studies against various other food-borne pathogens showed a reliably sensitive detection of the target pathogen. Successful identification of *Vibrio parahaemolyticus* (spiked and unspiked) in fresh cockles, combined with its simplicity and portability demonstrate the potential of the device as a practical screening tool.

**Keyword:** *Vibrio parahaemolyticus*; Food-borne pathogens; Electrochemical DNA sensor; Shellfish; Portable biosensor