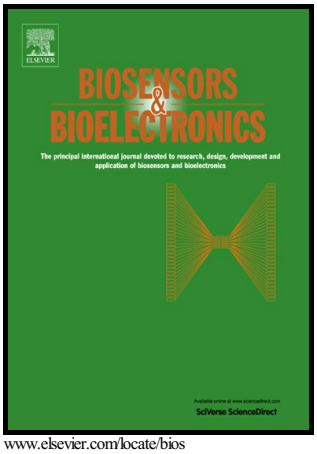

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A novel screen-printed mast cell-based electrochemical sensor for detecting spoilage bacterial quorum signaling molecules (N-acyl-homoserine-lactones) in freshwater fish

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Abstract

A novel screen-printed cell-based electrochemical sensor was developed to assess bacterial quorum signaling molecules, N-acylhomoserine lactones (AHLs). Screen-printed carbon electrode (SPCE), which possesses excellent properties such as low-cost, disposable and energy-efficient, was modified with multi-walled carbon nanotubes (MWNTs) to improve electrochemical signals and enhance the sensitivity. Rat basophilic leukemia (RBL-2H3) mast cells encapsulated in alginate/graphene oxide (NaAgl/GO) hydrogel were immobilized on the MWNTs/SPCE to serve as recognition element. Electrochemical impedance spectroscopy (EIS) was employed to record the cell impedance signal as-influenced by *Pseudomonas aeruginosa* quorum-sensing molecule, *N*-3-oxododecanoyl homoserine lactone ($3OC_{12}$-HSL). Experimental results show that $3OC_{12}$-HSL caused a significant decrease in cell viability in a dose dependent manner. The EIS value decreased with concentrations of $3OC_{12}$-HSL in the range of 0.1 to 1 μM, and the detection limit for $3OC_{12}$-HSL was calculated to be 0.094 μM. These results were confirmed via cell viability, SEM, TEM analysis. Next, the sensor was successfully applied to monitoring the production of