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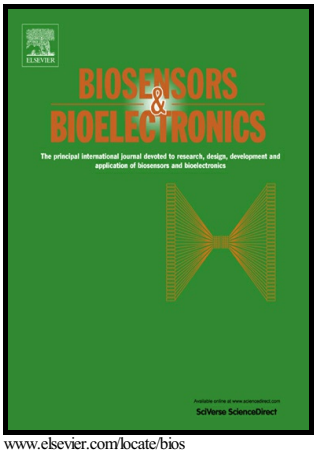

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Electric-field driven assembly of live bacterial cell microarrays for rapid phenotypic assessment and cell viability testing

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Abstract

Microarray technology to isolate living cells using external fields is a facile way to do phenotypic analysis at the cellular level. We have used alternating current dielectrophoresis (AC-DEP) to drive the assembly of live pathogenic Salmonella typhi (*S.typhi*) and Escherichia coli (*E.coli*) bacteria into miniaturized single cell microarrays. The effects of voltage and frequency were optimized to identify the conditions for maximum cell capture which gave an entrapment efficiency of 90% in 60 min. The chip was used for calibration-free estimation of cellular loads in binary mixtures and further applied for rapid and enhanced testing of cell viability in the presence of drug via impedance spectroscopy. Our results using a model antimicrobial sushi peptide showed that the cell viability could be tested down to 5 μg/mL drug concentration under an hour, thus establishing the utility of our system for ultrafast and sensitive detection.

Graphical abstract