Using an e-tongue based on impedance spectroscopy to detect E. Coli

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Food contamination by bacteria is still a serious public health problem, which has motivated research on the development of low-cost devices capable of real time response to detect contamination at an initial stage. Most of the contributions in the literature, however, involve biosensors employing complex, time-consuming methodologies requiring high cost equipment. In this study, we developed an electronic tongue (e-tongue) for detecting *Escherichia Coli* (E. Coli) in which the sensing units comprise pepsin, lysozyme and trypsin enzymes and poly(allylamine hydrochloride) (PAH) polyelectrolytes in layer-by-layer (LbL) films. The optimized conditions for adsorption of the various layers were determined from investigation of the kinetics of adsorption for the enzymes, while UV-Vis absorption spectroscopy and atomic force microscopy were used to monitor film growth. Distinct nanostructured layer architectures were deposited onto platinum interdigitated electrodes to measure with impedance spectroscopy the electrical response for the medium containing E. Coli bacteria. Capacitance and tan δ data were used for statistical analysis using visualization methods within the PEx-Sensors software. The results indicate that the e-tongue is able to clearly discriminate between non-contaminated and contaminated samples with bacteria, in the range from 10^3 to 10^7 CFU.

We thank the FAPESP, CNPq, CAPES, and nBioNet network for financial support. Acknowledgments are also given to Angelo L. Gobbi and Maria H. O. Piazzetta for use of the microfabrication laboratory (LMF/LNNano-LNLS).