Abstract Submitted
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A Nanocoaxial-Based Electrochemical Sensor for the Detection of Cholera Toxin[1] MICHELLE ARCHIBALD, BINOD RIZAL, TIMOTHY CONNOLLY, MICHAEL J. BURNS, MICHAEL J. NAUGHTON, THOMAS C. CHILES, Boston College, BIOLOGY AND PHYSICS COLLABORATION — We report a nanocoax-based electrochemical sensor for the detection of bacterial toxins using an electrochemical enzyme-linked immunosorbent assay (ELISA) and differential pulse voltammetry (DPV). The device architecture is composed of vertically-oriented, nanoscale coaxial electrodes, with coax cores and shields serving as integrated working and counter electrodes, respectively. Proof-of-concept was demonstrated for the detection of cholera toxin (CT), with a linear dynamic range of detection was 10 ng/ml - 1 g/ml, and a limit of detection (LOD) of 2 ng/ml. This level of sensitivity is comparable to the standard optical ELISA used widely in clinical applications. The nanocoax array thus matches the detection profile of the standard ELISA while providing a simple electrochemical readout and a miniaturized platform with multiplexing capabilities, toward point-of-care (POC) implementation. In addition, next generation nanocoax devices with extended cores are currently under development, which would provide a POC platform amenable for biofunctionalization of ELISA receptor proteins directly onto the device.

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