Abstract Submitted
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The Extended Core Coax: A Novel Nanoarchitecture for Electrochemical Sensing of Infectious Disease Biomarkers[1] AMY E. VALERA, MICHELLE M. ARCHIBALD, JEFFREY R. NAUGHTON, TIMOTHY CONNOLLY, MICHAEL J. BURNS, THOMAS C. CHILES, MICHAEL J. NAUGHTON, Boston College — We report the development and fabrication of a novel nanoarchitecture for electrochemical sensing, the extended core coax (ECC). Each ECC is a vertically oriented nanocoax, comprised of an extended inner metal core and an outer metal shield, separated by a dielectric annulus. The inner (gold) and outer (chrome) metals serve as the working and counter electrodes, respectively, with ∼200 nm separation gap / annulus. Arrays with a base area of 0.1 mm^2 were fabricated, each containing $\sim 10^5$ individual ECCs connected in parallel. Previous iterations of the nanocoax have demonstrated ∼100x greater electrochemical response over a planar control due to the nanoscale proximity of the working and counter electrodes [1]. We anticipate the ECC will function similarly, and offer the additional benefit of overcoming diffusion limitations due to the extended core working electrode, which protrudes ∼200 nm above the shield of the ECC. Additionally, the extended gold core provides a substrate for biofunctionalization, making the ECC an attractive candidate for further development towards electrochemical detection of infectious disease biomarkers such as cholera toxin.

[1] B. Rizal, et al., Anal. Chem. 85, 10040 (2013).

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