2015 MRS Fall Meeting & Exhibit, November 29-December 4, 2015, Boston Massachusetts USA

L6.14

The Extended Core Coax: A Novel Nanoarchitecture for Electrochemical Detection of Infectious Disease Biomarkers

Amy Valera[1], Michelle Archibald[1], Jeff Naughton[1], Michael Burns[1], Michael J Naughton[1], Thomas C Chiles[1]

[1]Boston College, Chestnut Hill, Massachusetts, United States.

Highly specific and sensitive platforms for detection of clinically relevant biomarkers are critical for accurate disease diagnosis. Pathogens such as Vibro cholerae continue to cause significant mortality in resource-limited areas, where low cost, point-of-care (POC) diagnosis is ideal. While standard tools such as an enzyme linked immunosorbant assay (ELISA) meet diagnostic specificity and sensitivity needs, they cannot be utilized outside a clinical setting, at the site of the patient. To fill this unmet need for specific and sensitive disease detection with POC accessibility, we propose to use 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 core, comprised of gold, acts as a working electrode which extends ~200 nm above the chrome counter electrode. Arrays with a base area of ~2000 μm^2 each contain ~2000 individual ECCs connected in parallel. The extended gold core provides a potential substrate for molecular imprinting of proteins, making the ECC an attractive candidate for development as a biosensor for electrochemical detection of infectious disease biomarkers such as cholera toxin..