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Abstract Submitted
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The Extended Core Coax: A novel nanoarchitecture for lab-on-a-chip electrochemical diagnostics[1] AMY E. VALERA, LUKE D'IMPERIO, MICHAEL J. BURNS, MICHAEL J. NAUGHTON, THOMAS C. CHILES, Boston College — We report a novel nanoarchitecture, the Extended Core Coax (ECC) that has applicability for the detection of biomarkers in lab-on-a-chip diagnostic devices. ECC is capable of providing accessible, highly sensitive, and specific disease diagnosis at point-of-care. The architecture represents a vertically oriented nanocoax comprised of a gold inner metal core that extends ˜200nm above a chrome outer metal shield, separated by a dielectric annulus. Each ECC chip contains 7 discrete sensing arrays, 0.49 mm^2 in size, containing ˜35,000 nanoscale coaxes wired in parallel. Previous non-extended nanocoaxial architectures have demonstrated a limit of detection (LOD) of 2 ng/mL of cholera toxin using an off-chip setup [1]. This sensitivity compares favorably to the standard optical ELISA used in clinical settings. The ECC matches this LOD, and additionally offers the benefit of specific and reliable biofunctionalization on the extended gold core. Thus, the ECC is an attractive candidate for development as a full lab-on-a-chip biosensor for detection of infectious disease biomarkers, such as cholera toxin, through tethering of biomarker recognition proteins, such as antibodies, directly on the device. [1] M.M. Archibald, et al., Biosens. Bioelectron. (2015)

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Amy E. Valera
Boston College

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