Abstract Submitted
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Biological Applications of Extraordinary Electroconductance (EEC)[1] L.C. TRAN, F.M. WERNER, S.A. SOLIN, Washington University in St. Louis — Rapid detection of biomolecular concentration is a fundamental goal for lab on a chip diagnostic systems. The Extraordinary Electroconductance (EEC) sensor, a stacked, AuTi-GaAs metal semiconductor hybrid structure (MSH), has been previously demonstrated to have an electric field sensitivity of 3.05V/cm[1] in a mesoscopic-scale structure fabricated at the center of a parallel plate capacitor. In this work, we demonstrate the first successful application of EEC sensors as electrochemical detectors of molecular binding to the sensor surface. The negatively charged avidin derivative, captavidin, was applied with varying captavidin concentrations in phosphate buffered saline (PBS). The four-point measured resistance of bare EEC sensors was shown to increase by a factor of four due to captavidin binding at the sensor surface, as compared to a baseline binding assay in which the captavidin binding sites were blocked. Calculations for approximate electric field strengths introduced by a bound captavidin molecule will also presented. EEC sensors' four point measurements showed robustness and stability in spite of variations in the functional, linking layer. Ref [1] A.K.M. Newaz, et al, Phys Rev B. 79, 195308 (2009).

[1]S.A.S. is a co-founder of and has a financial interest in PixelEXX, a start-up company whose mission is to market imaging arrays.

Stuart Solin
Washington Univ

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