Abstract Submitted
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Scalable Production of Biosensors Based on Aptamer-Functionalized Graphene for Detection of the HIV drug Tenofovir[1] RAMYA VISHNUBHOTLA, JINGLEI PING, A.T. CHARLIE JOHNSON, University of Pennsylvania, CHARLIE JOHNSON GROUP TEAM — Graphene field effect transistors (GFETs) are of great interest for biosensing applications, and have shown promising results for small molecular detection due to high sensitivity and electron mobility. We describe the fabrication of a scalable array of GFETs through traditional photolithography using lab-grown graphene via chemical vapor deposition (CVD) for drug detection with an all-electronic read-out. Sensor fabrication produced 52 devices per 2 x 2 cm area, with a yield of over 90%. Our biosensors use a commercially-obtained aptamer, verified to bind to graphene via AFM, to bind to the molecules of the drug Tenofovir, a medication currently used for HIV treatment, and have proven to detect concentrations at 1 ng/mL, 10ˆ3 times lower than standard medical methods. We noted a concentration-dependent shift in the Dirac voltage for Tenofovir, and testing control drugs showed that the aptamer was only highly selective in binding to Tenofovir itself. These results are promising for potential clinical testing with urine samples, as our method is scalable and non-invasive. This work is funded by NIH through the Center for AIDS Research at the University of Pennsylvania.

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