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Biosensors based on DNA-Functionalized Graphene RAMYA VISHNUBHOTLA, JINGLEI PING, AMEY VRUDHULA, A.T. CHARLIE JOHNSON, Univ of Pennsylvania — Since its discovery, graphene has been used for sensing applications due to its outstanding electrical properties and biocompatibility. Here, we demonstrate the capabilities of field effect transistors (FETs) based on CVD-grown graphene functionalized with commercially obtained DNA oligomers and aptamers for detection of various biomolecular targets (e.g., complementary DNA and small molecule drug targets). Graphene FETs were created with a scalable photolithography process that produces arrays consisting of 50-100 FETs with a layout suitable for multiplexed detection of four molecular targets. FETs were characterized via AFM to confirm the presence of the aptamer. From the measured electrical characteristics, it was determined that binding of molecular targets by the DNA chemical recognition element led to a reproducible, concentration-dependent shift in the Dirac voltage. This biosensor class is potentially suitable for applications in drug detection. This work is funded by NIH through the Center for AIDS Research at the University of Pennsylvania.

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