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Graphene field-effect biosensor arrays B. WANG, Department of Physics, Penn State University, K.L. LIDDELL, C.D. KEATING, Department of Chemistry, Penn State University, J. ZHU, Department of Physics, Penn State University — We report on the study of chemical and biological sensing using graphene field-effect transistor (GFET) arrays. Large-scale single layer graphene sheets are synthesized by low-pressure chemical vapor deposition on copper. We fabricate GFET arrays capable of operating in solutions by passivating the graphene channel with a thin oxide layer. This oxide layer also serves as the electrolyte gate dielectrics and the sensing surface. The GFET arrays exhibit an average field-effect mobility of ~ 5000 cm^2/Vs and small hysteresis in gate sweeps. We demonstrate the sensing operation of the GFET via measuring the pH value of phosphate buffer solutions. Gate sweeps indicate an approximately linear shift of the Dirac point with increasing pH, with an average slope of +46mV/pH. The viability of using GFETs to detect the specific binding of biomolecules will also be discussed.

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