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Solution-gated Field Effect Transistors based on CVD grown Graphene for chemical and bio sensing applications BENJAMIN MAILLY GIACCHETTI, ALLEN HSU, HAN WANG, KI KANG KIM, JING KONG, TOMAS PALACIOS, MIT — Graphene holds great potential for bioelectronic applications and, more specifically, for fast high-sensitivity pH measurements and biosensing. Its monolayer structure (just one carbon atom thick) in combination with its very high carrier mobility enable very high transconductance, low noise and biocompatibility which are key parameters for chemical sensors with electronic readout. In fact, single molecule detection has already been demonstrated in graphene gas sensors. In this paper we report on the fabrication and characterization of solution-gated field effect transistors (SGFET) arrays based on CVD grown graphene films on copper that can operate in various liquid environments. These devices exhibit transconductances around 20 μSiemens, which highlights their excellent sensitivity. We also performed some pH sensing experiments and demonstrated that the transfer characteristics of the GFET are pH dependent with a pH sensitivity of 14 mV/pH. These results drive the way for chemical and bio-sensing by functionalized graphene, which is the aim of our future work.

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