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Intrinsic Response of Graphene Vapor Sensors YE LU, YAPING DAN, University of Pennsylvania, NICHOLAS KYBERT, University of Warwick, CHARLIE JOHNSON, University of Pennsylvania — Ye Lu[1], Yaping Dan[1], Nicholas J. Kybert[2], A. T. Charlie Johnson[1], [1] *University of Pennsylvania, USA* [2] *University of Warwick, UK.*Graphene is a purely two-dimensional material that has extremely favorable chemical sensor properties. It is known, however, that conventional nanolithographic processing typically leaves a resist residue on the graphene surface, whose impact on the sensor characteristics of the system has not yet been determined. Here we show that the contamination layer both degrades the electronic properties of the graphene and masks graphene's intrinsic sensor responses. The contamination layer chemically dopes the graphene, enhances carrier scattering, and acts as an absorbent layer that concentrates analyte molecules at the graphene surface, thereby enhancing the sensor response. We demonstrate a cleaning process that verifiably removes the contamination on the device structure and allows the intrinsic chemical responses of graphene to be measured. Additionally, methods of functionalizing clean graphene device as high quality chemical vapor sensor are explored. Funding: JSTO DTRA and the Army Research Office Grant #W911NF-06-1-0462, NSF-NSEC/NBIC DMR-0425780, REU program of the Laboratory for Research on the Structure of Matter (N.J.K.).

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