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Linear magnetoresistance of graphene in contact with inhomogeneous disordered graphitic carbon JINGLEI PING, MICHAEL FUHRER, Center for Nanophysics and Advanced Materials, University of Maryland, College Park — We synthesized graphene via chemical vapor deposition(CVD) on platinum foils and transferred graphene to Si_3N_4 membranes for inspection by transmission electron microscope (TEM), or to SiO_2/Si for fabricating field-effect transistors. Dark-field TEM shows that the graphene is decorated with disordered (nanocrystalline) graphitic carbon which is spatially inhomogeneous. The impurity layer can easily be mistaken for a second graphene layer in optical microscopy. Atomic force microscopy shows that impurities form between graphene and Pt, supporting a "growth-from-below" model. The impurity-decorated graphene exhibits linear magnetoresistance (LMR) which is carrier-density-dependent and nonsaturating up to 8 Tesla. No LMR is observed with graphene samples with little impurities, or in exfoliated graphene. We understand the LMR as due to an effective inhomogeneous random-resistor network arising from the spatially inhomogeneous nature of the graphene/impurity system. The results may shed light on the previously-observed LMR in graphene on Si-face SiC.

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