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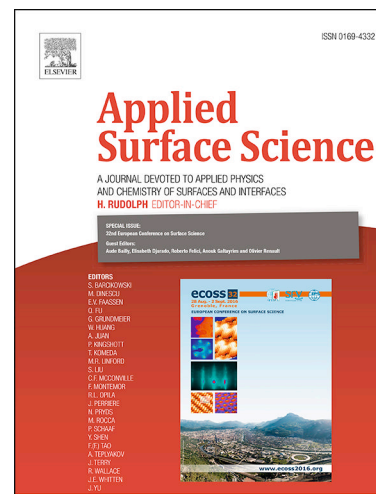
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Different spectroscopic behavior of coupled and freestanding monolayer graphene deposited by CVD on Cu foil

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Abstract

The growth of graphene on copper foil has been performed, following the well-known low-pressure chemical vapour (LP-CVD) procedure. The as-deposited monolayer graphene clearly exhibits two different coupling behaviours with the metal substrate, as demonstrated by visual microscopic investigation and by other experimental techniques, like Scanning Electron Microscopy (SEM) and micro-Raman spectroscopy. The single graphene sheet shows both large areas where it is coupled to the metal substrate and others where it exhibits freestanding-like characteristics. This phenomenology appears to be related to oxidation of the copper surface. In addition, we demonstrate the possibility to induce a variation of the coupling state by visible-light irradiation above a proper power threshold. The resulting change of the coupling with the metal substrate is associated to a local variation of the work function. Applications in high-performance electronic devices can be suitably tailored by optical methods and, in principle, by any local probe producing “hot spots” such as Scanning Tunneling Microscopy (STM) tips and electron beams.

Keywords: Graphene; Chemical Vapor Deposition; Copper foil; Raman Spectroscopy.

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