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Changing the electronic properties of graphene by alkali halides on Cu(111)

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Abstract

Graphene exhibits remarkable electronic properties and is a promising material for electronic applications. (*1*) Common ways to obtain graphene are a top down preparation by exfoliation from graphite (*2*) or a bottom up synthesis on transition metal surfaces by chemical vapour deposition (CVD). (*3,4*) The latter allows for a controlled preparation of well-defined carbon thin-films in ultra-high vacuum (UHV). (*4*) While the presence of the metal surface is essential for catalysis, the interaction of graphene with a metal substrate alters the electronic properties. (*5*) To regain the unique properties, graphene has to be transferred to an insulating surface. (*3*)

In-situ decoupling of graphene would promise a cleaner and more controllable approach towards graphene electronics. Like Graphite, Graphene on transition metals can be intercalated by metal atoms, (*6*) small molecules (*7*) and thin films (8) that decouple graphene from the metal substrate.

We studied the changes in electronic properties of graphene by KBr deposition on Cu(111). Small hexagonal graphene islands were obtained by chemical vapour deposition (CVD) of ethylene. (*5*) After deposition of the alkali halide these islands were surrounded by the insulating thin-film. The co-adsorption of the thin-film induced a shift in the work function graphene. This gave a first indication that graphene has been decoupled from the substrate. X-ray photoelectron spectroscopies(XPS), measured at the PSI, showed a change within the carbon core level of graphene and a second species for KBr.

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