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Interaction of magnetic and non-magnetic metals with graphene

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Abstract:
The investigation of the electronic properties of graphene-metal interfaces is of great current interest, not only from a fundamental point of view, but also with respect to possible applications in electronic devices and other fields. The (111) surface of iridium is used as a template for graphene growth, in view of the weak interaction between the partners, and due to the excellent structural quality. The used experimental method is photoemission and –absorption. The intercalation of transition metal thin films offers the possibility to modify the electronic properties of graphene.

I report on my findings for graphene on bulk and intercalated metals in between graphene and Ir(111). Intercalated copper layers are a particularly important example since the signatures of hybridization between metal states and the graphene π band are especially clear. Moreover the mechanism of band gap opening can be explained by DFT calculations. On the other hand electronic and magnetic structure investigations for intercalated cobalt layers show the emergence of ferromagnetic ordering in the cobalt films and is reported and analyzed by recourse to theory. The transfer of magnetic moment onto the formerly paramagnetic graphene π states is evident from x-ray magnetic circular dichroism measurements at the carbon K edge. Altogether, a consistent overview of metal-graphene interface electronic structure is given.