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Structure and magnetism of cobalt intercalated graphene/Ir(111) via spin-polarized STM REGIS DECKER, JENS BREDE, Institute of Applied Physics, University of Hamburg, NICOLAE ATODIRESEI, VASILE CACIUC, STEFAN BLUEGEL, Institut für Festkörperforschung, Forschungszentrum Jülich, ROLAND WIESENDANGER, Institute of Applied Physics, University of Hamburg — The presence of intercalation compounds in graphite, i.e. impurities or layer(s) trapped between carbon sheets, can lead to changes in the transport, optical and catalytic properties compared to bulk graphite, or even superconductivity. Here, we present the local structure and magnetic properties of graphene on a magnetic substrate, resolved by spin-polarized STM. The magnetic substrate is obtained by the intercalation of a cobalt layer between graphene and an Ir(111) surface. The atomic structure of the graphene layer is dominated by a highly corrugated Moiré pattern, which arises due to the incommensurability and/or twisting angle of the graphene lattice and the Co/Ir(111) surface. Within the Moiré unit cell three different regions, i.e. top, fcc, and hcp regions are identified. Interestingly, these regions show very different electronic and magnetic signatures in the experiments, defining an atomic-scale magnetic Moiré pattern. The observed spin polarization is compared to density functional theory calculations. The calculations reveal that the bonding between the graphene layer and intercalated Co layer varies from weak to strong within the Moiré unit cell. Moreover, the interaction between the graphene and the intercalated cobalt layer leads to a spin dependent charge rearrangement, which induces magnetism in graphene as observed in experiment.

Regis Decker
Institute of Applied Physics, University of Hamburg

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