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Electronic properties of graphene on metal substrates

Elena Voloshina
Humboldt University of Berlin, Germany

Graphene grown on metal surfaces is an exciting field of materials chemistry and physics from different points of view. Technologically, this is the main and the most perspective way for the large-scale preparation of high-quality graphene layers of different thicknesses with controllable properties. The obtained systems might be used for many applications, like spin filters, gas sensors, or in case of graphene-based moiré structures as templates for the preparation of exceptionally well-ordered nano-cluster lattices. Along with the practical view on these systems, experimental and theoretical investigations of graphene/metal interfaces gave rise to variety of fundamental questions. Two of them are: (1) nature of bonding between graphene and metal, and (2) origin of modifications of the electronic structure of graphene in vicinity of the Fermi level. Aiming to shed more light on the problem of the interaction of graphene with the substrates and modification of its electronic structure, different examples of the graphene-metal interfaces have been considered. Based on the analysis of a large amount of experimentally and computationally obtained band structures, we proposed a universal model, which allows one to describe qualitatively any graphene-metal system. All experimental observations can be understood in the framework of the approach. This work summarizes the long-term debates regarding connection of the bonding strength and the valence band modification in the graphene-metal systems and paves a way for the effective control of the electronic states of graphene in the vicinity of the Fermi level.

Biography

Elena Voloshina received her PhD in Chemistry from Rostov State University, Russia in 2001. She was a Post-doctoral Research Associate at RWTH Aachen University, at the Max Planck Institute for the Physics of Complex Systems in Dresden and at the Free University of Berlin, Germany. Since 2014, she is a Senior Researcher at the Humboldt University of Berlin. She has co-authored more than 70 publications in peer reviewed journals.

elena.voloshina@hu-berlin.de

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