Epitaxial graphene on metals: charge-transfer effect

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To use the unique properties of the single-layer graphene (SLG) in nanoelectronics one has to have appropriate metal contacts and corresponding substrate to include SLG in the device configuration. Hence the problem of the SLG – metal interface arises. On of the main point in this problem is the electron-hole symmetry braking which originates from the charge transfer across metal- SLG interface. Here we consider this effect within the frame of the model used earlier for the description of the epitaxial SLG on the silicon carbide substrate [1].

We begin with the Anderson model for substrate which we cover by the carbon adatoms arranged them to form the SLG structure. Then we find corresponding Green function and the epitaxial SLG (ESLG) density of states (DOS). This DOS permits us to calculate the occupation number for the carbon adatoms. It is this characteristic which accounts for charge-transfer effect. Underline, that the well-known small k approximation for the electron dispersion has been used to obtain the analytical expressions for the ESLG DOS and occupation numbers.

We have analyzed the number of metal components of the SLG-metal interfaces, such as: Ru, Al, Ni, Cu, Ag, Au, Pd, and Pt. It is shown that the electrons transfer from metals to the SLG. Rough estimations of the charge transfer values are fulfilled.

[1] S.Yu. Davydov. *Fizika i Tekhnika Poluprovodnikov* **45**, 629 (2011). (In Russian).