Nanoobjects microscopy

Synthesis and characterization of the graphene flakes on Ni

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Graphene flakes were obtained from solid carbon source [1,2] which represented carbon-rich a-SiC layer, fabricated by reactive RF magnetron sputtering on thermal growth SiO_2 film, dissolved in Ni film (deposited on a-SiC by DC magnetron sputtering technique) during long vacuum thermal heating and nitrogen rapid thermal treatment. The lateral size of graphene flakes was estimated to be about hundreds of micrometers while the thickness estimated using Raman scattering varied from one to few layers in case of vacuum annealing. Rapid thermal annealing (RTA) in nitrogen ambient results in formation of multilayer graphene with surface covering up to 80%.

Atomic force microscopy (AFM) indicates no graphene layers on structured nickel silicide surface. Employment of Kelvin probe force microscopy (KPFM) allows us to demonstrate occurrence of the layers with potential different from potential of nickel silicide surface which corresponds to graphene layers, and to perform correlation between number of graphene layers obtained from micro-Raman spectroscopy measurements and potential of the layers. It was shown that KPFM possesses a high sensitivity to graphene layers and graphite nanoclusters allows us to observe them even in absence of optical contrast from these structures.

1. *Hofrichter J., Szafranek B.N., Otto M., Echtermeyer T.J., Baus M., Majerus A., Geringer V., Ramsteiner M., Kurz H.* Synthesis of graphene on silicon dioxide by a solid carbon source // *Nano Lett*.-2010.-**10**.-P. 36-42.

2. *Nazarov A.N., Gordienko S.O., Lytvyn P.M., Strelchuk V.V., Nikolenko A.S., Vasin A.V., Rusavsky A.V., Lysenko V. S., Popov V. P.* Characterization of graphene layers by Kelvin probe force microscopy and micro-Raman spectroscopy // *Phys. Stat. Sol. C.*-2013.-**10**.-P. 1172-1175.