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Colloquia 2016

Thursday 16 June 2016 – 11:00 am

Laboratorio NEST
Pisa, Piazza San Silvestro 12
Nest seminar room

Yuya Murata

will give a seminar with the title:

"Hydrogen interaction with graphene"

Abstract:

Quasi-free-standing monolayer graphene (QFMLG) is obtained by intercalating H at the interface of buffer layer and the Si-face SiC(0001) substrate. The intercalated hydrogen saturates the Si dangling bonds of the SiC substrate. Compared to epitaxial monolayer graphene, QFMLG shows less temperature dependence of mobility. Hence, QFMLG is efficiently decoupled from the substrate. However, the mobility of QFMLG at room temperature (~6000) is still lower than that of epitaxial monolayer graphene (~10000). Electric transport measurements have suggested that Si dangling bonds without H termination remain at the interface, and act as charged impurities. We studied the atomic and electronic structure of QFMLG by scanning tunneling microscopy and spectroscopy (STM/STS).

With STM we observed interface defects which we attribute to Si dangling bonds. STM observations reveal that these Si dangling bonds partially align with a SiC-(6x6) periodicity. Low temperature STS distinguished two types of Si dangling bonds by their different peak energies of 1.1 and 1.4 eV, which may arise from their different local graphene-Si stacking configurations. This interpretation is consistent with similar observations on the C-face of SiC.

Measurements on samples prepared at different intercalation temperatures show that hydrogenation at higher temperature promotes H intercalation. However, additional defects such as etch pits in the SiC substrate and wrinkles of graphene appear pronouncedly. The relationship between the morphology and transport properties of QGMLG suggests that the additional defects cause significant decrease of mobility, more than the positive influence of the increased H intercalation.

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