Scanning Probe Microscopy of CVD Graphene and its Crystallographically Controlled Nanopatterning

L. P. Biró[1] L. Tapasztó[1] G. Magda[1] P. Vancsó[1] G. Dobrik[1] G. I. Márk[1] X. Jin[2] Y. S. Kim[2] C. Hwang[2]

[1]Institute of Technical Physics and Materials Science, Research Centre for Natural Sciences, 1525 Budapest, PO Box 49, Hungary, (http://www.nanotechnology.hu/), Korean-Hungarian Joint Laboratory for Nanosciences (KHJLN), P.O. Box 49, 1525 Budapest, Hungary

[2]Center for Nano-metrology Division of Industrial Metrology Korea Research Institute of Standards and Science, 267 Gaejeong-ro, Yuseong-Gu, Daejeon 305-340, Republic of Korea, Korean-Hungarian Joint Laboratory for Nanosciences (KHJLN), P.O. Box 49, 1525 Budapest, Hungary

Graphene is an excellent candidate to replace silicon in nanoelectronics, to mention only one of the most exciting from its many potential applications [1]. Presently Chemical Vapor Deposition (CVD) is the industrially most viable way of producing large area graphene layers [2] at acceptable cost. The CVD graphene is polycrystalline [3], therefore the characterization of the grain structure and the effects arising from grain boundaries (GBs) is a must, if any serious practical applications are intended. AFM [4], and STM [5, 6] in combination with numerical simulations [7, 8] are extremely useful in understanding the structure and electronic properties of the GBs in CVD graphene. For the full exploitation of the possibilities of graphene, nanolithography with precise crystallographic orientation has to be achieved and the feature size has to be controlled with nanometer precision [9, 10, 11]. Recent results on graphene nanoribbons of width down to 2.5 nm, with zigzag or armchair edges prepared by scanning tunneling microscope lithography in CVD graphene on gold substrates will be discussed [12].

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