Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Graphene Morphology on Nano-Patterned Electronic Substrates

GUANGXU LI, CIHAN YILMAZ, XIAOHONG AN, SIVASUBRAMANIAN SOMU, SWASTIK KAR, AHMED BUSNAINA, KAI-TAK WAN, Northeastern University, DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING COLLABORATION, NSF NANOSCALE SCIENCE AND ENGINEERING CENTER FOR HIGH-RATE NANOMANUFACTURING COLLABORATION, DEPARTMENT OF PHYSICS COLLABORATION — In order to get high quality of graphene for the application in electronic devices, good transfer of graphene prepared by mechanical exfoliation or chemical vapor deposition is always required and substrate with flat surface is preferred to avoid the crack and destruction of the thin sheets. Here, we studied the graphene morphology on nano-patterned electronic substrates by transferring graphene grown from chemical vapor deposition onto the gold nano pillar patterns on silicon substrate. The adhesion between the graphene and the gold surface makes the flexible thin membrane conform to the substrate geometry and form a series of blisters. By measuring the blister radius and height, the adhesion energy of graphene and gold substrate can be deduced. In the meantime, the morphology of graphene on the pillar patterns was found to strongly related to the adhesion energy, the height and separation of pillars. By changing these parameters, the blisters may decrease size or expand to coalesce. The critical separation between pillars and the critical height of pillars were predicted to avoid the coalescence of the blisters when the adhesion energy was fixed. The results obtained here can be useful to increase the performance and the durability of the graphene based device.

Guangxu Li
Northeastern University

Date submitted: 26 Nov 2011 Electronic form version 1.4