

NANO HOUR

Wednesday, November 7, 2007

3:00 PM

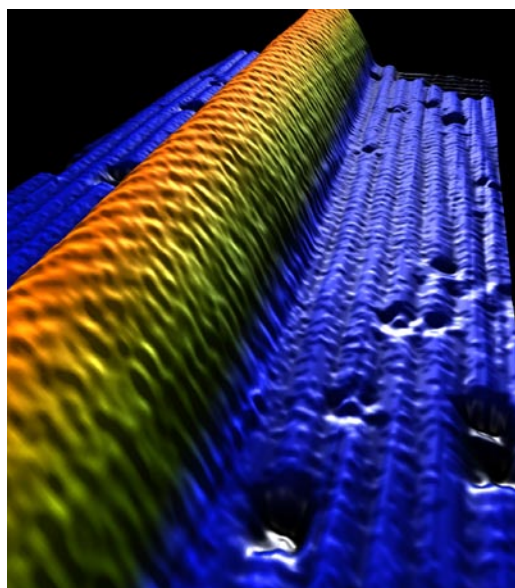
Beckman Institute – Room 3269

Carbon Nanotechnology: Scientific and Technological Issues

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Carbon nanotechnologies based on single-walled carbon nanotubes (SWNTs) and graphene (a single atomic layer of graphite) are being pursued for a wide range of technological applications ranging from chemical sensing to post-silicon nanoelectronics. A common thread is the need to atomistically understand the interactions between these novel carbon materials and their contacts and supports. To facilitate this effort we are using ultrahigh vacuum scanning tunneling microscopy (UHV STM) in conjunction with a new dry contact transfer (DCT) deposition process to provide an atomically clean look at these systems (image). For SWNTs, our observations show that there is a sensitive interplay between nanotube and substrate with preferred orientations that affect electronic properties. Using the atomic scale silicon surface modification process developed in our laboratory we are able to bandgap engineer the electronic structure of supported SWNTs. For nanometer scale single layer graphene sheets on H-passivated silicon we have observed quantum size effects in the form of a semiconducting gap that varies inversely with sheet size.



A practical issue with STM as well as any scanned probe experiment is the quality of the probe itself. We have developed a new process for producing probes with 1 nm radii of curvature in any conductive material. This technology is compatible with large scale batch processing for display applications.

Coffee and cookies will be served.

<http://nanohour.beckman.uiuc.edu>