

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Tuning the electrical and mechanical properties of carbon nanotubes interfaced with silicon surfaces using the UHV-STM PETER ALBRECHT, JOSEPH LYDING, University of Illinois at Urbana-Champaign — Nanoscale patterning of the Si(100)-2x1:H surface with the UHV-STM [1] is used to selectively modify the Si substrate acting as a semiconducting support for isolated single-walled carbon nanotubes (SWNTs) deposited via dry contact transfer (DCT) [2]. By desorbing H at the SWNT-Si interface, we can mechanically stabilize SWNTs that initially were only weakly coupled to the Si surface and thus highly sensitive to STM tip induced perturbations. Moreover, on the degenerately doped n-type H-Si(100) surface, the presence of negatively charged Si dangling bonds patterned in close proximity to a semiconducting SWNT decreases the magnitude of the substrate voltage required for the onset of filled states conduction through the SWNT. Our results suggest new opportunities for engineering – on the sub-nm scale – both the mechanical and electronic properties of SWNTs integrated with semiconductor platforms. [1] J.W. Lyding et al., APL 64, 2010 (1994). [2] P.M. Albrecht and J.W. Lyding, APL 83, 5029 (2003).

Peter Albrecht
University of Illinois at Urbana-Champaign

Date submitted: 30 Nov 2005

Electronic form version 1.4