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Ultrahigh Vacuum Scanning Tunneling Microscopy and Spectroscopy of Single-Walled Carbon Nanotubes Interfaced with Silicon Surfaces PETER ALBRECHT, JOSEPH LYDING, University of Illinois at Urbana-Champaign — The UHV-STM was used to examine SWNTs directly interfaced with hydrogen-passivated Si(100). Dry contact transfer (DCT) [1] enabled the UHV deposition of SWNTs with minimal disruption of the atomically flat Si(100)-2x1:H surface. Isolated, rather than bundled, SWNTs could be routinely located for atomically resolved imaging, tunneling I-V spectroscopy [2], lateral manipulation [3], and proximal substrate modification. Weakly adsorbed SWNTs initially unstable in the presence of the rastered STM tip could be stabilized by depassivating the underlying H-Si(100) surface via UHV-STM electron-stimulated H desorption [4], which in the case of one chiral semiconducting SWNT also promoted the local alignment of the zigzag symmetry direction on the underside of the tube with the clean Si dimer rows [5]. The growing body of first-principles simulations of the SWNT/Si(100) system [6] was drawn upon in our interpretation of such local perturbations. [1] APL 83, 5029 (2003). [2] Nanotechnology 18, 095204 (2007). [3] Small 3, 146 (2007). [4] Nanotechnology 18, 125302 (2007). [5] Small 3, 1402 (2007). [6] JAP 100, 124304 (2006).

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