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UHV-STM of single-walled carbon nanotubes in registration with the atomic lattices of silicon surfaces PETER ALBRECHT, JOSEPH LYDING, Beckman Institute, University of Illinois at Urbana-Champaign — A room-temperature UHV-STM is used to elucidate the registration dependence of the electronic and mechanical properties of single-walled carbon nanotubes (SWCNTs) adsorbed onto silicon surfaces. The SWCNTs are deposited onto the Si surface in situ using a dry contact transfer (DCT) technique [1], with the resultant pristine SWCNT-Si interface enabling a joint atomic-resolution topographic and spectroscopic study of individual SWCNTs on both clean and H-passivated Si(100)-2x1 surfaces. Pronounced variations in the I-V and dI/dV-V spectra acquired along an isolated SWCNT were found to correlate with a transition from parallel to perpendicular alignment of the tube with respect to the dimer rows of the clean Si surface. Recent theoretical work [2] suggests that SWCNT-Si alignment is indeed energetically favorable and may give rise to novel nanotube-surface interactions unobserved in previous STM studies of SWCNTs in contact with a metallic substrate. [1] P.M. Albrecht and J.W. Lyding, APL 83, 5029 (2003). [2] W. Orellana, R.H. Miwa, and A. Fazzio, PRL 91, 166802 (2003).

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