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Integration of carbon nanotubes into atomic resolution UHV-STM lithography and nanofabrication schemes on H-passivated Si(100) surfaces PETER ALBRECHT, JOSEPH LYDING, Beckman Institute, University of Illinois at Urbana-Champaign — Nanoscale patterning of the Si(100)-2x1:H surface with the UHV-STM [1] is leveraged to chemically modify the Si substrate acting as a pristine semiconducting support for isolated single-walled carbon nanotubes (SWCNTs). By intercepting an isolated SWCNT with a sub-5-nm-wide pattern of Si dangling bonds [2], we can reproducibly strengthen the SWCNT-Si interaction which is directly manifested as an enhanced mechanical stability of the SWCNT in the presence of the rastered STM tip and a concomitant topographic depression. Spatially-resolved tunneling conductance maps have been generated for individual SWCNTs spanning both depassivated and unperturbed domains on the Si(100)-2x1:H surface. We have also demonstrated the controlled manipulation of SWCNTs with the STM tip, including the reversible actuation of a 13-nm-long segment intentionally cut from a longer SWCNT and the splitting of two SWCNTs originally in wall-to-wall contact. [1] J.W. Lyding et al., APL 64, 2010 (1994). [2] P.M. Albrecht and J.W. Lyding, Superlattice Microst. 34, 407 (2003).

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