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Near surface dopant depletion in UHV prepared H-Si(100): spectroscopic and imaging effects JASON PITTERS, NINT-NRC, ROBERT WOLKOW, University of Alberta — Dangling bonds (DBs) have been shown to be useful in directing chemical reactions on silicon and for atom scale electronics such as quantum cellular automata. One enabling aspect of DBs is that they can assume various charge states depending on the type and level of crystal doping. We have found that for degenerately doped n-type silicon, the scanning tunneling spectroscopy (STS) and imaging characteristics H-Si(100) surfaces and DBs varies depending on the preparation method. Samples heated to 1050 $^\circ$C were found to have a consistent level of doping throughout the bulk and near surface regions. Samples heated to 1250 $^\circ$C showed a reduced dopant concentration in the near surface region. STS showed shifted I/V spectra. The loss of degeneracy was indicated by the loss of tunneling through dopant states in the band gap. These results show that UHV prepared silicon does not have a consistent dopant profile and that the bulk dopant density should not be assumed in the near surface region. This has important ramifications for DB imaging and modeling.

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