Isolated dangling bonds on H:Ge(001) surface

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Both geometric and electronic structures of the Ge(001) surface change upon hydrogen adsorption since almost all the dangling bonds present on the surface are passivated. However, certain number of isolated single and double dangling bonds remain intact. Moreover, it is possible to form new defects in a controlled way by tip-induced desorption of hydrogen. In the presentation, we will present the results of STM and NC-AFM investigation into properties of such defects. A force 3D spectroscopy of a single dangling bond defect shows characteristic spatial distribution of the interaction. While the force curves over hydrogen atoms surrounding the defect show no sign of attractive interaction, the force curves over the defect has a range where the short-distance attractive force is detected. On the other hand, a double dangling bond forms a switch, since naturally it stays in a tilted configuration. The controlled switching is possible both by STM and NC-AFM. Additionally, it is possible to alternate the local electronic structure by creation of patterns of defects giving a chance to form a wire-like structures for molecular electronics.