

INVESTIGATION OF THE Si(111)7×7 SURFACE
NEAR CORNER PITS BY TUNNELING
MICROSCOPE WITH VARIOUS TIPS

S.Yu. Bulavenko, P.V. Melnik, M.G. Nakhodkin

Radiophysics Department,
Taras Shevchenko Kyiv National University
(64, Volodymyrska Str., Kyiv 03033, Ukraine)

S u m m a r y

A change of the local density of electronic states (LDOS) of Si(111)7×7 atoms under hydrogen adsorption in corner pits is studied with a scanning tunneling microscope with usual (W) and special (Bi/W) tips. Hydrogen adsorption in a corner pit is found to result in increase of LDOS of neighbor adatoms on the unfaulted halves of 7×7 unit cells. This increase in STM-images obtained in the constant current mode appears as an increase of brightness of adatoms on the unfaulted halves of 7×7 unit cells corresponding to the increase of the registering height of these adatoms in STM-images by 0.1 Å. The found increase of LDOS of the adatoms on the unfaulted halves of 7×7 unit cells is in a good agreement with the theoretical prediction that explains the increase as a delocalization of the exceed electronic density of a corner pit atom due to hydrogen adsorption. The LDOS of other atoms on the Si(111)7×7 surface are shown to be practically insensitive to hydrogen adsorption into the corner pits. The change of LDOS is observed with both Bi/W and usual tips. Application of the phenomenon of the change of LDOS of adatoms on the unfaulted halves as an indicator of hydrogen adsorption in corner pits in STM- investigations with usual tips is offered. Use of such an indicator is suggested to be appropriate for the investigation of the adsorption of other adsorbates in corner pits. Our analysis of STM-images of the SiH₂Cl₂/ Si(111)7×7 interface is the evidence in favor of the suggestion.