SF-002

Sb-passivation of Si(114)-2×1

Otgonbayar Dugerjav, Hidong Kim, Ganbat Duvjir, Huiting Li, Jae M. Seo

Department of Physics and Institute of Photonics and Information Technology,
Chonbuk National University, Jeonju 561-756, Korea

The Si(114)-2×1 surface (composed of dimer, rebonded-atom, tetramer rows) has been passivated by Sb atoms and investigated by STM and high-resolution synchrotron photoelectron spectroscopy (PES). From the STM images, it has been found that the surface structure is transformed from 2×1 to 2×2 (as shown in the figure image), when the Sb coverage is over 0.25 ML. Once the surface structure has become 2×2, instead of the surface-related components of the Si 2*p* core-level, only one dominant Sb-Si interfacial component has appeared at the higher binding energy of 0.25 eV than the bulk (as shown in the figure spectrum). It has been deduced by combined results of STM and PES that such a simple interface is due to Sb atoms which substituted the topmost Si atoms and the resulting binding-energy-shift is determined by different electronegativity of two kinds of atoms. The Sb 4*d* core-level spectrum is also fitted by one component, which confirms that Sb atoms are in a unique surface site. These facts clearly indicate that Sb atoms passivate the (114) surface through removing the surface dangling bonds of Si(114)-2×1.