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Observation of all dangling bond states and potential variation among them by noncontact atomic force microscopy YUKIO HASEGAWA, TOYOAKI EGUCHI, K. AKIYAMA, T. AN, M. ONO, ISSP, Univ. Tokyo and PRESTO, JST, Japan, Y. FUJIKAWA, T. SAKURAI, IMR. Tohoku Univ., Japan, T. HASHIMOTO, AIST, Japan, Y. MORIKAWA, ISIR, Osaka Univ., Japan, K. TERAKURA, Hokkaido Univ., Japan, M. LAGALLY, Univ. of WisconsinMadison — High-resolution non-contact atomic force microscope (AFM) images were successfully taken on the Ge(105)-(1x2) structure formed on the Si(105) substrate and revealed all dangling bonds of the surface regardless to their electronic situation, surpassing the scanning tunneling microscopy, whose images were strongly deviated from the atomic structure by the electronic states involved. An atomically resolved electrostatic potential profile by a Kelvin probe method with AFM shows potential variations among the dangling bond states, directly observing a charge transfer between them. These results clearly demonstrate that high-resolution non-contact AFM with a Kelvin probe method is an ideal tool for analyses of atomic structures and electronic properties of surfaces.

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