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**Observation of growth of Si(111)-7x7 reconstructed surface with simultaneous step flow and nucleation** SHIN-ICHIRO KOBAYASHI, MASAHI MATSUSHITA, KING ITAYA, School of Engineering, Tohoku University — The structure of Si(111)-7x7 surface (7x7) has been extensively investigated for five decades and established, both experimentally and theoretically, that the reconstructed surface is described by the dimer-adatom-staking fault model. Recently, we succeeded in observing the peculiar 7x7 surface in not only macroscopic area but also atomic level. Images by the laser confocal microscopy (LCM)[1] provided us the alternative step structure in macroscopic area. By utilizing AFM, the step height almost corresponded to the step for ten layers of atomic step. This indicates that the step bunching by step flow was occurred by current heating to Si substrate. In addition, by investigating the atomic surface by STM in detail, we could find Si clusters or inlands with about  $10 \text{ nm}^2$  at the tip of the step as well as confirm the step bunching. The growth of this structure is originated from simultaneous nucleation by unit cell on 7x7 surface due to energy fluctuation and step flow by current heating. Observation of surface in wide range area by SPM and LCM is useful to understand the growth of mechanism of ultra-flat surface in semi-conductive and metallic surfaces. [1] S. Kobayashi et al, Electrochem. Solid-State Lett., 14, H351(2011) .

Shin -ichiro Kobayashi  
School of Engineering, Tohoku University

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