Abstract Submitted
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Observation of Finite-Size Effects on a Structural Phase Transition of 2D Nano-Islands ING-SHOUH HWANG, Institute of Physics, Academia Sinica, SHIH-HSIN CHANG, CHUNG-KAI FANG, TIEN T. TSONG, INSTITUTE OF PHYSICS, ACADEMIA SINICA TEAM — The monolayer Pb-covered Si(111) surface exhibits a 1×1-Pb phase at room temperature. The structure undergoes a reversible transformation into a $\sqrt{7}\times\sqrt{3}$-Pb reconstruction at low temperatures. With a variable-temperature scanning tunneling microscope (STM), we study the phase transition of Pb nano-islands on Si(111). Our observations indicate that no coverage change occurs across the phase transition. On the 1×1 structure, Pb adatoms are located at the T_1 site and the coverage is exactly 1 ML. The $\sqrt{7}\times\sqrt{3}$ phase is basically a distorted 1×1 structure with some Pb adatoms slightly displaced from their T_1 site to form trimer rows. This phase transition may involve only small displacements of Pb atoms without breaking the Pb-Si bonds. Our STM observations also show that the transition temperature decreases with decreasing domain (island) size [1]. The boundaries of the nano-islands also influence the transition. At temperatures around the transition temperature, temporal fluctuations in structures can be seen. Careful examination of the change in the surface structure near the transition temperature reveals the fast dynamics associated with the thermal fluctuations. [1] I.-S. Hwang et al., Phys. Rev. Lett. **93**, 106101 (2004).

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