Abstract Submitted
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Metallic Transport and Anderson Localization on In Atomic Layers on Silicon SHIRO YAMAZAKI, The Institute for Solid State Physics, The University of Tokyo, YOSHIKAZU HOSOMURA, IWAO MATSUDA, REI HOBARA, SHUJI HASEGAWA — Metallic temperature dependence of electrical resistance have not been observed except extremely limited number of examples[1] below 100K in atomic-scale low-dimensional metal systems due to Anderson localization. Si(111)-$\sqrt{7} \times \sqrt{3}$-In surface reconstruction consist of 1.2 ML In atoms. According to ARPES study, the surface is 2D metal with the large Fermi wave number (k_F=14nm^{-1}) and the large electron density (4.6×10^{14}eV^{-1}cm^{-2}), leading to a low resistance [2]. By using variable-temperature micro-four-point probe method [3], low resistance and metallic transport was found down to 10 K. It is quantitatively explained by the ARPES result by using Boltzmann equation $R_{2D} = \frac{4\pi^2\lambda m^*}{e^2\hbar k_F^2} k_B T$. By introducing defect, it shows semiconducting temperature dependence of variable range hopping due to Anderson localization. [1]K. Lee, *et al.* , Nature **441**, 65 (2006). [2]E. Rotenberg, *et al.* , Phys. Rev. Lett. **91**, 246404 (2003). [3]T. Tanikawa, *et al.* , e-J. Surf. Sci. Nanotech. **1**, 50 (2003)

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