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Direct Evidence of the Charge Ordered Phase Transition of Indium Nanowires on Si(111) SE JUN PARK, HAN-WOONG YEOM, SUK-HWA MIN, DO-HYANG PARK, IN-WHAN LYO, Institute of Physics and Applied Physics, Yonsei University 120-749, Seoul, Rep. of Korea — The self-organized indium nanowires on Si(111) surface is an ideal model system exhibiting an 1D metallic character on a surface. As temperature is lowered, this system undergoes a reversible phase transition from a (4 x 1) phase at room temperature to a (8 x 2) phase at ∼125 K via periodicity doubling along the nanowires. By means of low-temperature scanning tunneling microscopy and spectroscopy, we investigated the temperature dependent electronic structures of the system. We found that the phase transition is truly a metal-insulator transition with an energy gap opening and the low-temperature phase is indeed *charge ordered* along the wires, with the out-of-phase distribution of the occupied and unoccupied states[1]. The analysis of charge orderings near defects above T_c reveals that a lattice distortion can be distinguished from a charge ordering. A fluctuating charge-ordered state is also found in In wires terminated by two out-of-phase defects. Our observations provide the crucial evidence for the CDW ground state of the system. [1]S. J. Park, H. W. Yeom, S. H. Min, D. H. Park, and I. W. Lyo, Phys. Rev. Lett. 93, 106402 (2004)

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