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First-order phase transition in In/Si(111)-4×1 JONGHOON YEO, HYUNGJOON SHIM, GEUNSEOP LEE, Department of Physics, Inha University — In/Si(111)-4×1 surface is known to undergo a temperature-induced structural phase transition between a high-temperature (HT) 4×1 phase and a low-temperature (LT) 8×2 phase. The issues on the nature of this temperature-dependent phase transition, whether it is of order-order (displacive) or order-disorder type and first-order or second-order, are unsettled. We investigated the 4×1-to-8×2 phase transition by using LEED and STM. We observed a hysteresis of the LEED beam intensities as the temperature changes during cooling and heating. This hysteresis indicates that the structural phase transition is of first order. STM images revealing the coexistence of the 4×1-HT and 8×2-LT phase domains during the transition are consistent with the first-order transition. An influence of the defects on the phase transition of this In/Si(111) surface will be discussed.

Jonghoon Yeo
Department of Physics, Inha University

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