

Abstract Submitted  
for the MAR05 Meeting of  
The American Physical Society

**Defect-induced period-doubling perturbation on Si(111)4x1-In**  
GEUNSEOP LEE, Inha University, Korea, SANG-YONG YU, HANCHUL KIM,  
JA-YONG KOO, Korea Research Institute of Standards and Science, NANO-  
SURFACE COLLABORATION — We investigated using STM and LEED the in-  
fluence of defects at room temperature on the quasi-one dimensional Si(111)4×1-In  
surface which changes into a 4×2 (or 8×2) phase below 120 K. Various types of  
defects (vacancy, step edge, and phase shift boundary) and adatoms (H<sub>2</sub>, O<sub>2</sub>, and  
In) were found to induce local period-doubling (×2) modulations at room temper-  
ature. The ×2 modulated region shows metallic  $I - V$  characteristics, having little  
change from that of the defect-free 4×1 region despite the difference in topology in  
the image. Therefore, the defect-induced ×2 modulation is discriminated from the  
low-temperature phase that was reported to be insulating. Using the first-principles  
calculations, the ×2 modulation is found to originate from a different 4×2 structure  
of the clean surface that is stabilized by the presence of defects. The nature of the  
phase transition of this In/Si(111) system and the influence of the defects will be  
discussed.

Geunseop Lee  
Inha University

Date submitted: 01 Dec 2004

Electronic form version 1.4