

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Effect of external strain on the order-disorder phase transition of the Si(001) surface MASANORI YATA, National Research Institute for Materials Science — The Si(001) surface exhibits the phase transition from $c(4\times 2)$ to the (2×1) structure at about 200 K[1, 2]. This is an order-disorder phase transition with respect to the buckling of the dimer: the $c(4\times 2)$ structure results from an antiferromagnetic ordering of the buckled-dimer and the (2×1) structure is attributed to the time average of the flip-flop motion of the buckled-dimers. Externally applied tensile strain along the $\langle 110 \rangle$ direction on the Si(001) surface is found to induce the flip-flop motion of the buckled dimer below the critical temperature. This motion occurs cooperatively to form the disordered domain of the (2×1) structure. Then the shape of the ordered domain as well as the size change with the strain. These results can be interpreted by the spontaneous shape instability originated from the strain relaxation energy. References [1] J. Ihm, D.H. Lee, J.D. Joannopoulos and J.J. Xiong, Phys. Rev. Lett. **51**, 1872(1983). [2] T. Tabata, T. Aruga and Y. Murata, Surf. Sci. **179**, L63(1987).

Masanori Yata
National Research Institute for Materials Science

Date submitted: 15 Jan 2006

Electronic form version 1.4