

[II-1]

## **Strain Relieving of Epitaxially Grown Ge Layers on Si Mesa Structure**

Y.-H. Khang and Young Kuk

Department of Physics, Seoul National University, Seoul 151-742, Korea

Though the critical thickness with varying  $x$  have been reported in the  $\text{Ge}_x\text{Si}_{1-x}/\text{Si}$  system, the misfit dislocation and/or misfit strain have been one of the biggest stumbling blocks for the better performance of the devices.

In a small island, epitaxial film with rather large misfit strain ( larger than Frank-van der Merwe limit ) can be grown. In order to understand the electronic structure dependence on the misfit strain, we have grown epitaxial layer on Si mesa structures: with varying sizes ranging  $0.6\mu \sim 30\mu$  patterned by electron lithography. The strain dependence was studied by scanning tunneling microscope/spectroscopy, UPS and Raman spectroscopy. The strain relieving via step arrangement was observed in STM/STS and the shift of phonon peak was observed in Raman spectroscopy. We'll discuss these observed electronic structural changes through the simple calculation by perturbation theory. The mechanism and possible application will be discussed.