

Measurement of the strain for the InGaAs layers grown on the step structure using x-ray microdiffraction

K. Izumi¹⁾, T. Koyama²⁾, Y. Tsusaka²⁾, and Y. Kagoshima²⁾

¹⁾*Fundamental and Environmental Research Laboratories, NEC Corporation*

²⁾*Graduate School of Material Science, University of Hyogo*

Metal-organic vapor phase epitaxial growth of InGaAs/InP system is widely used for fabricating photonic devices, because the multilayer thickness, composition, and lattice strain can be precisely controlled by only controlling flow rate of the source material gasses. In this work, we measured the position and the channel-width (Wc) dependence of the strain for the InGaAs (001) layers grown on the step structure of InP substrate(Fig. 1).

Experiment was carried out at the BL24XU in SPring-8 using a new high-resolution microdiffraction system [1]. The size of the focused beam is 0.32 μm vertically and 1.3 μm horizontally at a photon energy of 15 keV.

Figure 2 shows the position and channel-width dependence of the perpendicular strain determined from the peak shifts of the measured rocking curves. The positions shown in the Fig. 2 are the distances from the center of the step structure (Fig. 1). It can be seen that the strain changes largely at around the step position for large channel-width.

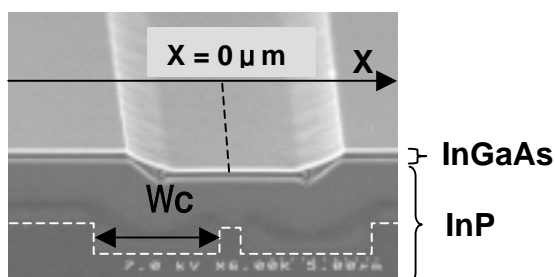


Fig.1 SEM image of sample

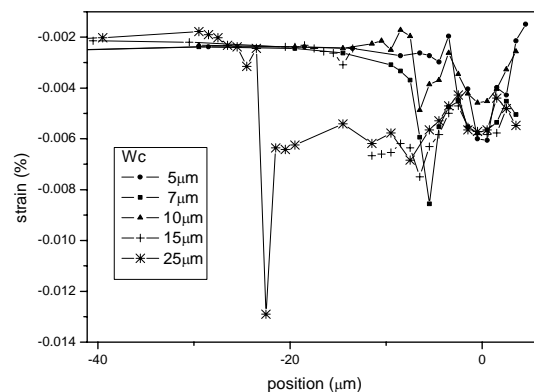


Fig.2 perpendicular strain of the InGaAs layer

[1] K. Izumi et al., SPring-8 User Experimental Report, No11, 320(2003A).