PS-11.01.25 PROFILING OF STRAIN AND DAMAGE DISTRIBUTION WITH DEPTH OF ION-IMPLANTATION ON STRAINED LAYER SUPERLATTICES. By S.S. G. Shanmugam, School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore 2263, and M.C. Shirvastava, Department of Electronics and Communication Engineering, I.I.T. Delhi, India

Ion implantation in Strained Layer Superlattices (SLSs) has been found to induce axial strain and lattice distortion arising out of damage due to random displacement of atoms (Meyers D.R., et al. J. Appl. Phys. 1986, 60, 3431-3440). Displacement damage from implantation causes an expansion of the implanted surface region due to point defect generation. Double axis X-ray Diffraction technique has been found to be extremely useful in the study of layer characteristics of SLS structures (Wie K.E., et al. J. Appl. Phys., 1986, 59, 3743-3746).

In the study made on 8e implanted GaAs/AlGaAs SLS, rocking curves have been effectively used to analyze damage and strain distribution with depth. A simulation of the (004) experimental rocking curves was performed using the model based on Takagi's theoretical X-ray diffraction of distorted crystal, wherein, the effect of spherically symmetric Gaussian distribution of randomly displaced atoms has been incorporated in the form of a modified structure factor, Fh' = Fh exp (-2 sinh2 (βh) Y2) L2, where U is the average atomic displacement. From a simulated fit to the experimental rocking curves, strain and damage distribution with depth has been evaluated. The results show that maximum strain and damage occur at about the same depth and that damage due to ion implantation varies linearly with the period of strain, as long as the implantation dose is low enough such that inter-diffusion or atomic disordering due to implantation can be neglected.

PS-11.01.26 A MODERN SYSTEM FOR HIGH-SPEED DATA COLLECTION FROM A POWDER DIFFRACTOMETER OF ALL KINDS. By Liu Huanmuch Wu, Central Laboratory, Nankai University, Tianjin, China.

The powder diffractometer of all kinds has been modified to accommodate data collection and storage by AST486 computer. The interface system is described and relatively low cost. The system is suitable for powder diffractometer of all kinds.

Introduction
The powder diffractometer collective techniques have been reviewed by several authors. Most of them were adopted from A/D converters. Inevitably, the use of A/D converters introduces compounds conversion errors. Therefore, our aim was to interface a AST486 computer to a powder diffractometer given the following basic requirements:
(1) The computer must confirm the scan beginning and the stepped motor drive to count stepped pulses.
(2) The computer can collect the intensity data from a high analyser.
(3) The X-ray diffraction profiles can be displayed and plot cut.

Hardware
developed for IBM XT/AT/PS2 computing, or compatible computers such as AST 486/COMPAG 185 with a 100M byte hard disk for the data collection and storage unit. A graphics adapter is required for this system which uses either an EGA or VGA or TVGA.

There are synchronism control signal port and data port in the interface. The control system of powder diffractometer was investigated, and it was found that the command signals are:
(1) high-level 5-12V signals from the pin of a computer's high drive when scan beginning.
(2) group of stepped pulses acted as interrupted signals.
The present system utilized these signal to synchro control the counter working. The data can be counted in binary or ASCII from PHA.

A program was written in Windows V3.0 and assembly V5.0 language for the interface system. It provides four functions:
(1) automatic data collection routine.
(2) rapid graph profiles routine.
(3) quick peak search routine.
(4) profiles edit and plot routine.
The collection routine allows the operator to set measurement conditions such as stepping angle and step width etc. for the data file index.
The operator can enlarge or reduce the scan chart under a Windows environment. The profiles can be printed out on the printer or X-Y plotter. The program packages are menu driven and easy to use. The intensity data is written to a data file by the operator. It can be transformed from binary into ASCII or FORTRAN format.


It has been reported that only polycrystal diamond film could be formed on heteroeptaxial substrate by CVD method, which stimulated great interest to grow homoepitaxial film. However, few reports concerned the growth on (111) orientation substrates. In this paper, a successful growth of homoepitaxy on (111) natural diamond substrate is presented by using microwave PECVD method. The experimental process was almost same as that of (100) homoepitaxy reported before. There was quite difference of the nucleation and growth between the layers on (111) and (100) oriented substrates. It was shown that the (111) epitaxial film could not be formed without the addition of oxygen. In fact, there was small deflection of the substrate surface to (111) direction. It was noticed that the smooth epitaxial layers have been formed in the whole 2-3nm2 area if argon was added to the reaction gases. The Raman spectroscopy showed a sharp diamond peak at 1333 cm-1 and a very small and broadening peak at 1550 cm-1 in relation to graph phase. X-ray double crystal diffraction proved a single (111) diffraction peak which (200) was 41.7°. The topography pictures of synchrotron radiation indicated good quality of the epitaxy. In grazing incident condition, the RHEED pattern with hexagonal symmetry kept all the same when the sample was moved.