07.8-3 EFFECT OF AN ARBITRARILY ORIENTED QUANTIZING MAGNETIC FIELD ON THE EINSTEIN RELATION IN N-CHANNEL INVERSION LAYERS ON TERNARY CHALCOPYRITE SEMICONDUCTORS. By S. Biswas, Department of Electronics and Telecommunication Engineering, Bengal Engineering College, Howrah-711103, West Bengal, India, S. Bhattacharyya, Consulting Engineering Services Pvt. Ltd., 591, Block 'O', New Alipur, Calcutta-700053, West Bengal, India, and K.P. Ghatak, Advanced Study Centre of Radio Physics and Electronics, 1, Girish Vidyaratna Lane, Calcutta-700009, West Bengal, India.

The Einstein relation for the diffusivity-mobility ratio of the carriers in semiconductors (hereafter referred to as DMR) is a very important one, since the simplest method of analysing semiconductor devices taking into account the degeneracy of the bands is to use the DMR to express the performance at the device terminals and the switching speed in terms of carrier concentration. In recent years, the connection of the DMR with the velocity auto-correlation function, its relation with the screening of carriers in semiconductors, and the various modifications of the DMR for semiconductors having different types of band structures under various physical conditions have been extensively investigated in the literature.

Keeping this in view, an attempt is made for the first time to investigate the DMR in n-channel inversion layers on ternary chalcopyrite semiconductors without any approximation of strong or weak electric field limits, in the presence of an arbitrarily oriented quantizing magnetic field by including the electron spin and broadening effects for the more difficult case which occurs from the new formulation of the dispersion relation of the conduction electrons considering all types of anisotropies in the energy spectrum. This has made our analysis a generalized one since we can obtain the corresponding results for n-channel inversion layers on parabolic semiconductors and also the DMR in the absence of magnetic quantization for various band models. It is found, taking n-channel $CdGeAs_2$ as an example, that the DMR exhibits an oscillatory magnetic field dependence and the oscillatory spikes are much sharper, with large magnitudes even in the presence of broadening in inversion layers, in contrast to those obtained for bulk semiconductors under magnetic quantization. Besides, the experimental result is in good agreement with our generalised theoretical formulation.

07.8-4 SECTION TOPOGRAPHIC STUDY OF SEMI-CONDUCTOR LASER CRYSTALS. By T. Tuomi, J.A. Lahtinen, H. Lipsanen and J. Partanen, Laboratory of Physics, Helsinki University of Technology, Espoo
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Semiconductor lasers emitting at 1.3. and 1.5 μm are grown by using liquid phase epitaxy (LPE) technique on two different type of substrates: liquid encapsulated Czochralski (LEC) and vertical gradient freeze (VGF) grown indium phospide wafers.
Synchrotron section topographs are made before and after the LPE growth using spectrally continuous synchrotron radiation from the DORIS storage ring. The topographs of the VGF substrates show in general less defects (inclusions, precipitates, stacking faults and dislocations) than the LEC ones.
LPE-grown multilayer laser crystals seem to contain additional defects even in the lattice matched samples in which no misfit dislocations in the epitaxial layers are observed. In the buried heterostructure lasers grown on the VGF substrates topographic contrast is seen due to strain field around V-grooves. The epitaxial layers give rise to a strong contrast in certain reflections.
Both 100 and 111 substrates are investigated. The section topographs of the 111 samples show rather large black and white irregularly shaped domains.

07.8-5 X-RAY DIFFRACTION STUDY OF A SEMI-CONDUCTOR ALLOY, $AgIn_{0.8}Ga_{0.2}Te_{1.6}Se_{0.4}$. K. Treechairusme and P. Phavanantha, Department of Physics, Faculty of Science, Chulalongkorn University, Bangkok 10500, Thailand.

$AgIn_{0.8}Ga_{0.2}Te_{1.6}Se_{0.4}$, a pentenary semiconductor alloy belonging to a series of alloy, $Cu_{1-x}Ag_xIn_{1-y}Ga_yTe_{2(1-z)}Se_{2z}$ (J.C. Woolley et al, J. Appl. Phys., 1981, 52(10), 6423-5) was prepared by direct melt-and-anneal method. The structure was found to be tetragonal, space group $I\bar{4}2d$, a = 6.347(1) A, c = 12.313(2) A, Dm = 5.8 gm cm^{-3}, Z = 4, Dc = 6.0 gm cm^{-3}, and $\mu_{MoK\alpha}$ = 211.74 cm^{-1}.

The variation of lattice constants a and c, with temperature ranging 27 - 560 °C, was found empirically to fit the following equations

$$a = 6.3405 + (4.7663\times10^{-5})T, \text{ for } T = 27\text{-}210\ ^\circ C;$$

$$a = 6.3534 + (7.4178\times10^{-5})T, \text{ for } T = 290\text{-}560^\circ C;$$

$$c = 12.3137 - (5.9043\times10^{-4})T + (5.5181\times10^{-6})T^2$$

Weissenberg multiple-film technique with MoKa was used to record 86 independent reflections, the intensities were measured visually, and corrected for absorption. The structure was solved by the heavy-atom method and found to be similar to chalcopyrite, $CuFeS_2$ (S.R. Hall and J.M. Stewart, Acta Cryst. 1973, B29, 579-585), the parameters were refined by least-squares method to a final R index of 0.081. The atoms of Ag, $(In_{0.8}Ga_{0.2})$ and $(Te_{0.8}Se_{0.2})$ were found to occupy special positions in the unit cell at 4a, 4b and 8d.