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factorily predict the observed dependence upon hole concentration. This discrepancy can be qualitatively explained if one takes into account the probable geometry of the hole Fermi surface for the overlapping valence band.

*This research was conducted under the McDonnell Douglas Independent Research and Development Program.

FF 4 Galvanomagnetic Measurements at Hydrostatic Pressure on $Hg_{1-x}Cd_xTe$ Alloys Near the Semimetal-Semiconductor Transition.* C. T. ELLIOTT,† JOHN MELNGAILIS, T. C. HARMAN and J. A. KAFALAS, Lincoln Laboratory, M.I.T.--The variation of Hall coefficient, R, and resistivity with magnetic field has been measured at pressures up to 9 kbar on p-type $Hg_{1-x}Cd_xTe$ samples with x in the range 0.14 to 0.17. Results have been obtained at 77°K, 4.2°K and 1.3°K. A sharp rise in the plots of resistivity vs. pressure and an abrupt change in the sign of R identify the semimetal-semiconductor transition (which at 4.2°K and $x = 0.14$ occurs at 8 kbar). From an analysis of the data using multiband models the variation of electron concentration with pressure has been obtained. This variation of electron concentration, over more than two orders of magnitude, is compared with theoretical predictions using the Kane model. At high pressures, where the electron concentration is negligible, good fits to the experimental data are obtained using a two hole band model, e.g., in a sample with $x = 0.14$ at 9 kbar and 4.2°K the light and heavy hole concentrations are found to be 3.6×10^{12} cm^{-3} and 2.7×10^{17} cm^{-3} respectively. Carrier freeze-out is observed in this extrinsic region.

*This work was sponsored by the Department of the Air Force.
†Permanent address: Royal Radar Establishment, England.

FF 5 High-Mobility Layers of PbTe and $Pb_{1-x}Sn_xTe$. H. HOLLOWAY and E. M. LOGOTHETIS, Ford Motor Company, Dearborn, Michigan. -- High mobility epitaxial layers of PbTe and $Pb_{1-x}Sn_xTe$ (with $x \approx 0.2$) have been prepared by post-growth annealing. Typically, layers 1-7 μm thick were grown on cleaved BaF_2 and then heated in vacuo at 300-350°C for 20-100 hrs. Unlike as-grown layers, these specimens retain bulk values of the Hall mobility at temperatures down to 50°K with saturation values greater than 10^5 cm^{2}V^{-1}sec^{-1}. This result contrasts with previous reports that layers of IV-VI compounds on alkali halide substrates have mobilities that are decreased by post-growth heating. The difference appears to arise from differences in the match between the thermal expansion coefficient of the substrate and that of the deposit. Thus, the increased mobilities of layers on BaF_2 may be attributed to increase of the sub-grain size in the epitaxial layer during annealing and the failure to observe the effect with layers on alkali halides is probably a consequence of masking by damage introduced by differential contraction after the anneal. These results have potential application to $Pb_{1-x}Sn_xTe$ photoconductors.

FF 6 Compensation and Ionized Defect Scattering in PbTe and Other IV-VI Compounds. E. M. LOGOTHETIS and H. HOLLOWAY, Ford Motor Company, Dearborn, Michigan. -- Analysis of annealing data for PbTe predicts compensation of native defects that depends on the thermal history. A model of ionized defect scattering in cubic IV-VI compounds (possessing 4 equivalent anisotropic bands) is developed for arbitrary degeneracy by introducing longitudinal and transverse relaxation times. Non-parabolic effects are neglected which limits the applicability of the theory to carrier concentrations $\lesssim 5 \times 10^{18}$ cm^{-3}. Experimental low temperature mobilities of PbTe, PbSe and PbS are in good agreement with the theory. The inclusion of compensation in our model can explain the PbTe mobility results of Kobayashi et al.[1] who observed an increase in mobility with carrier concentration $< 10^{18}$ cm^{-3}, and the wide range of values of the low temperature mobility that has been observed in PbTe and other IV-VI compounds.

[1] A. Kobayashi et al., Proc. Inter. Conf. Sem., Paris (1964) p. 1257.

FF 7 Transport Measurements and Electroluminescence in n-type Gallium Phosphide-Zinc Selenide Alloys.* PHIL WON YU, MAURICE GLICKSMAN, and AARON WOLD, Brown Univ.-- Electrical measurements were made in the temperature range 8-360 K for crystalline samples of alloys with low ZnSe content (below 5%). The temperature dependence of the mobility shows the dominance of ionized impurity scattering over the temperature range 130-250 K. The mobility is a monotonically increasing function of temperature in the range 50-250 K and indicates possible hopping contributions to the conductivity below 50 K. Diodes were prepared by Zinc diffusion. Weak electroluminescence in the visible range of the spectrum was observed.

*Work supported in part by NASA under Grant No. NGR 40-002-094.

FF 8 Non-Ohmic Transport and Current Controlled Negative Resistance in CdSe. R. P. KHOSLA, J. R. FISCHER and B. C. BURKEY, Eastman Kodak Company.--We have measured the conductivity, Hall coefficient and mobility of CdSe samples, varying in electron concentration from 3×10^{15} to 1.1×10^{17} cm^{-3}, under high electric fields at low temperatures. The conductivity shows non-ohmic behavior beyond 3-5 V/cm; at the same field the Hall coefficient starts to increase, but decreases rapidly beyond 100 V/cm. At about 120 V/cm, breakdown takes place and the samples show a region of current controlled negative resistance (CCNR). A discussion will be given of the non-ohmic transport in terms of the various scattering mechanisms and the subsequent CCNR due to the impact ionization of the shallow donors.

FF 9 Photocarrier Multiplication Due to Impact Ionization of the Shallow Donors in CdSe. J. R. FISCHER and R. P. KHOSLA, Eastman Kodak Company.--In the previous paper we reported the observance of current controlled negative resistance (CCNR) in CdSe. This was attributed to the impact ionization of the shallow donors. It is found that under band gap illumination, large photocarrier multiplication can take place. Photogains $\left(\frac{\text{number of electrons}}{\text{number of photons}}\right) \approx 10^4$ are obtained. The photogain increases with decreasing temperature. These results can be understood qualitatively in terms of the model proposed by Crandall[1] in which the photoexcited carriers screen the electron-ionized impurity and the electron-phonon interactions. This leads to a hotter electron distribution and increased impact ionization of the shallow donors which, in turn, cause the sample to switch from its low current to a high current stage. The effect of light intensity and the concentration dependence of the photogains will be discussed.

[1] R. S. Crandall, J. Phys. Chem. Solids, 31, 2069 (1970).

FF 10 Thermal Conductivity of Mg_2Ge and Mg_2Si. J. J. MARTIN, Okla. State Univ.--The lattice thermal conductivities of the semiconductors Mg_2Ge and Mg_2Si have been measured from 3 to 200K. Neutral donor-phonon scattering was observed in Mg_2Ge by comparing the results for an al doped crystal, $n_d = 5 \times 10^{16}$ cm^{-3} with an undoped crystal, $n_d = 5 \times 10^{14}$ cm^{-3}. The Mg_2Si crystal contained several low angle grain boundaries which masked any possible electronic scattering effects. The lattice conductivi-