tigations show that this method can provide information simultaneously about a number of deep dislocation energy levels in silicon single crystals. The results obtained by thermostimulated depolarization are compared with data obtained by traditional methods (Hall effect, spectral dependence of photoconductivity).

It is shown that a slip plane assumes the role of a new two-dimensional defect of the revealed structure. This two-dimensional defect is made up of an assembly of point-defect complexes which are formed in dislocation conditions and are left in the slip plane. This is caused by a smaller diffusion coefficient compared to that of the point defects. It is observed that part of point defects gathered by dislocation are transported by pipe diffusion to the crystal surface where they are fixed as microprecipitates. The dependence of the observed effects on temperature and duration of deformation, on thermal treatment conditions, and on impurity contents of the crystals has been investigated.

11.3-07 DISLOCATION MOBILITY IN SEMICONDUCTOR CRYSTALS IN CONNECTION WITH THEIR REAL STRUCTURE.

By I.E. Bondarenko, V.I. Nikitenko, B.Ya. Farber, Institute of Solid State Physics Academy of Sciences of the USSR. Chernogolovka, Moscow distr., USSR.

The investigations of the dislocation mobility in covalent crystals have revealed essential contradictions between the experimental data and predictions of the theory of the dislocation mobility in a deep Peierls potential of the ideal lattice.To study the cause of the revealed discrepancies an investigation of dislocation mobility in Ge and Si has been made under conditions permitting one to select the contribution of the dislocation splitting and dislocation-point defects interaction to the movement of dislocations.The measurements of the dislocation velocity in Ge have been fulfilled within a high temperature range T > 600°C,that have not been studied earlier.It has been found that at low stresses the activation energy for the dislocation motion decreases essentially as compared with the low temperature range.The analysis has shown that the behaviour of the temperature dependence of the velocity cannot be described in terms of the theoretical models based on the assumption of the influence of point defects on kink migration,even if the dislocation splitting and the reduction of point defects concentration with rising temperature are taken into account.It was,however,observed,that the results can qualitatively be described by these models at low temperature T < 600°C.Investigating the dislocation mobility dependence in Si and Ge on the conditions of bringing the dislocation to the starting position,it turned out possible to reveal a number of essential characteristics of dislocation-point defects interaction.It has been shown that the dislocation mobility is determined not only by the initial impurity contents of the crystals,but by point defects collected by the dislocation during its motion.The concentration and structural state of such defects depend on the dislocation velocity,pathway length and thermal treatment conditions upon bringing the dislocation to the starting position.It has been found that impurities collected by the dislocation as well as complexes,forming from gathered impurities in the field of dislocation microstresses, determine the kink mobility and give rise to a decrease of dislocation velocity and to the appearence of the starting stress.The high temperature data obtained for Ge can be explained under the assumption of the structural state changes of collected impurities occuring in some temperature range.It has been found that the dislocation velocity increases during the movement of the same dislocation as its motion direction is reversed.It is shown that this effect is not connected with the different resistance to the motion of partial dislocations,from which the perfect dislocation consists,but it is probably stipulated by the influence of the change in point defects state in the glide plane swept off by dislocation.The results obtained necessitate an account of the various manifestations of dislocation-point defects interaction in a real crystal leading to the essential change of the potential relief of the crystal lattice in the volume adjacent to the dislocation and in the region swept off by moving dislocation.

11.4-01 THE DETERMINATION OF DEBYE CHARACTERISTIC TEMPERATURES OF CRYSTALS FROM X-RAY POWDER DIFFRACTION INTENSITIES.

By S. S. Lu and J. K. Liang,Institute of Physics, Academia Sinica, Beijing, China.

The methods of determining Debye characteristic temperatures from X-ray powder diffraction intensities have been fully discussed.

In the case of homogeneous and isotropic crystals,if the natural logarithms of the ratios of calculated intensities to observed intensities $\ln(I_{calc.}/I_{obs.})$ of all diffraction lines are plotted against $\sin^2\theta/\lambda^2$, the slope of the straight line obtained should give 2B, where B is the Debye parameter.

For anisotropic crystals,if $\ln(I_{calc.}/I_{obs.})$ of (hk0) and (00l) reflexions are plotted against $\sin^2\theta/\lambda^2$ respectively, the two straight lines obtained should intercept at the same point on the ordinate axis. The slopes of the straight lines should give $2B_{\parallel}$ and $2B_{\perp}$,where $B_{\parallel}$ and $B_{\perp}$ represent the Debye parameters parallel and perpendicular to the principal axis respectively.

For inhomogenous crystals, if there are two kinds of atoms(a) and (b) in the crystal, then the diffraction lines in the Debye-Scherrer photograph may be classified into two categories: the structure factors are either the sum F^s or the differece F^d of the structure factors of the respective atoms. Owing to the fact that both F^s and F^d are functions of $\sin\theta/\lambda$, so,if the observed values of $F^s_{obs.}$ and $F^d_{obs.}$ are plotted against $\sin\theta/\lambda$, two smooth curves should be obtained. From these two curves the corresponding values