07.2-05 SINGLE PHASE BOUNDARIES (Sn-Ge) DIFFUSION AND SURFACE TENSION. By B.S.Bokstein, L.M.Klinger, B.B.Straumal, L.S.Shwindlerman. Solid State Physics Institute, Academy of Sciences of USSR, Chernogolovka, Moscow district, USSR, 142432.

A process has been developed to produce single-phase-boundary bicrystals with crystallographic parameters preset.

Direct measurements were taken of the surface tension and boundary diffusion of indium on a sequence of single phase twist boundaries, with a common axis of the fourth order in the (Sn-Ge) system.

The obtained orientational dependences of surface tension, as well of coefficient and activation energy of boundary diffusion, are materially non-monotonic in nature. The position of minima in the orientational curve of the surface tension is close to coordinates of the coincidence boundaries calculated for the twist grain boundaries <100> . The maxima in all the orientational dependences of the diffusion coefficient conform to boundaries with a low surface tension (obtained at 40; 80; 120 and 160°C).

Thus, the specific phase boundaries, in contrast to the grain ones, possess a higher diffusion permeability. Probably, this is connected with peculiarities of chemical interaction of components (Sn, Ge, In) on the phase boundaries.

07.2-06 EFFECT OF SUCCESSIVE DOUBLE BREAK-AWAY OF MOVING GRAIN BOUNDARY FROM ADSORBED IMPURITY. By Ch. V. Kopezky, D.A. Molodov, L.S. Shvindlerman, Solid State Physics Institute, Academy of Sciences of USSR, Chernogolovka, Moscow district, USSR, 142432.

The motion of a coincidence boundary (46,5° 111) has been investigated in high purity aluminium bicrystals alloyed with iron (0.5; 0.6; 0.8 ppm) The technique involved a constant driving force of the migration process and the use of apparatus for the steady automatic X-ray monitoring of the grain boundary position.

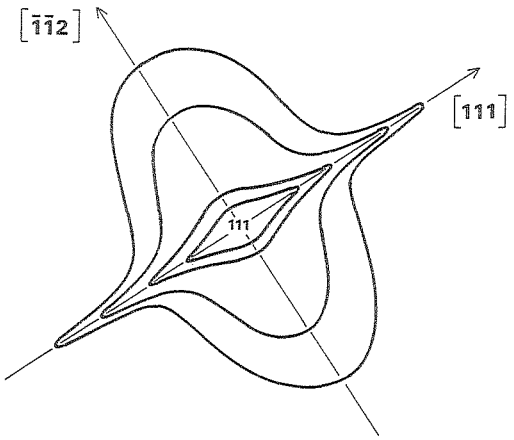
A successive double jump in velocity attending a change in the activation energy of the migration has been revealed in the experimental data on temperature dependence of the boundary velocity ($\lg V$-T^{-1}).

The results obtained attest that the observed boundary velocity jumps are connected with break-away of the boundary from the adsorbed atoms of iron. Quantitative analysis of the experiment was made within the limits of the impurity drag theory and on this basis the parameters of boundary-impurity interaction were determined.

Anomalously low and anomalously high values of the pre-exponential factor and activation energy of iron diffusion in aluminium are in good agreement with the results of diffusion measurements.

07.2-07 X-RAY DIFFUSE SCATTERING FROM REAL (111) GaAs SURFACES. By C. Bocchi and C. Ghezzi, Istituto MASPEC del C. N. R. Parma, Italy.

The intensity of the X-ray diffuse scattering near the 111 reciprocal lattice node in GaAs was carefully measured using Cukα radiation. Etching NH_4OH-H_2O_2 solutions were used to prepare the (111) Ga face. Despite the presence of oxide layers as thick as 1000 Å, only the phonon scattering was detected when the usual combinations of chemical and mechanical actions were avoided. On the other hand, an extra diffuse X-ray intensity was observed when a mechanical action by soft plastic cloths was used simultaneously with the chemical one. Diffuse equi-intensity contours in the (hhl) plane of reciprocal space are shown in the figure. They extend sharply along the [111] direction and exhibit large gradients along the [$\bar{1}\bar{1}$2] one. Moreover, the extra-intensity decreases quickly with increasing $(\sin\vartheta)/\lambda$. It has been suggested that mixed Ga_2O_3, As_2O_3 and As_2O_5, whose presence was confirmed by ESCA experiments, are in a crystalline form and that the wiping mechanical action introduces a high degree of preferred orientation with oxide related planes being parallel to the (111) GaAs surface. The extended shape of the equi-intensity contours along the [111] direction has been ascribed to a two-dimensional effect and an oxide thickness of (20±3) Å has been derived by comparing the observed and calculated ratios between the oxide Bragg scattering and the GaAs phonon scattering at different scattering angles.
The possibility of observing an X-ray scattered intensity whose features depend on the chemical and structure state of surface layers has been demonstrated by this experiment.



(hhl) plane