The mechanism I probably occurs through the adsorption of the complexes CdBr$_3$" (n<6), which turn into CdBr$_4$" in the adlayer and enter the crystal lattice. Estimated from the R(C,T) curves the adsorption heats Q (kcal/mol$^1$) are quite high: Q$_{100}$=Q$_{111}$=16. It seems that these Q-values include additional heat for the complex formation on the crystal surface.

The R(C)-I curves follow the equation of Bliznakov (Fortschr. Min. (1958) 26, 140), which permits the calculation of the surface diffusion activation energy for the adsorbed impurity complexes: 1075 cal for (100) and 720 cal for (111) KBr.

The mechanism II is a result of the formation of two-dimensional adsorption phases. That is why the R(C,T) curves the adsorption heats Q (kcal/mol$^1$) are quite high: Q$_{100}$=Q$_{111}$=16. It seems that these Q-values include additional heat for the complex formation on the crystal surface.

Here C$^*$ is the C-value, for which R$_{100}$/R$_{111}$ at the corresponding T.

These data seem to give a good explanation of two well known crystallographic phenomena: a) minute impurity traces stimulate the growth of more perfect single crystals - mechanism I with strong passivating effect, but without any change in the R$_{100}$/R$_{111}$ ratio; b) habit modifications always occur at higher C-values. The succession of the action of mechanisms I and II and their different temperature dependence is the reason for the low concentration limits of the impurity habit changing activity.

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crystalline layers at and below the interface, can be interpreted in terms of a roughening of the crystal surface. Trajectory plots normal to the interface show the onset of a cooperative melting process, and consequent distortions of the nearby crystal penetrate to 2-5 layers below the interface. Results from constant volume and triple point calculations designed to suppress these modes will be presented, and the detailed structure of the equilibrium interface discussed.

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07.2.03 METASTABLE PHASES IN THIN TIN AND LEAD FILMS AND THEIR OXIDES. By S.K. Peneva, K.D. Djunova and D.D. Mintzianova, University of Sofia, Chemical Faculty, 1, Anton Ivanov Rd., Sofia 1126, Bulgaria.

RHEED studies have shown that diamond cubic structures with lattice parameters around the lattice parameter of silicon exist both in thin Sn and Pb films and in massive tin and lead solidified in vacuum 4.10^-4 Torr, designated respectively as Sn(S1) and Pb(S1). It was found that three tin and lead intermediate oxides have almost identical structures. The initial oxides of Sn(S1) and Pb(S1) were identified as tin and lead analogues of SnO, demonstrating the similarity between tin and lead not only in the initial stages of crystallisation, but in the initial stages of oxidation (Peneva et al., J. Cryst. Growth, 62 (1981) in press). Depth selective Mössbauer Spectroscopy (DSMS) studies have shown a very high positive value of the isomeric shift \( \delta \) of Sn(S1) \( = 4.42 \pm 0.04 \) mm/s, relative to tin dioxide (Djunova et al., Thin Solid Films 72 (1980) 371). Different other tin substructures were observed at different evaporation velocities, obtained by changing the temperature of the source. Oxides of Sn(S1) and Pb(S1) were grown with \( \delta = 2.2 \pm 0.27 \) mm/sec, relative to tin dioxide. Films containing simultaneously textured α-Sn and tin/tinII intermetallic compound, with structure resembling the structure of CuAu and isomeric shift \( \delta \) (SnSnII(CuAu) \( = 1.00 \pm 0.27 \) mm/s, relative to tin dioxide were also detected. It appears that the structure of tin and lead films depends on the structure of different intermetallic clusters coming from the vapours (e.g. Honig, J. Chem. Phys. 21 (1953) 673). Popel et al. (Fizika Metallov i Metallovedenie, Russan, 2, 38 (1974) present diffraction evidence for cluster structures in molten tin. Heating of thin tin films up to 400°C leads to complicated multiphase textures, with displaced 000 points of the reciprocal lattices of the various phases. There is tendency for segregation of tin atoms with \( \gamma \) similar electronic states into groups of similar substructures, as a rule in incommensurate states. The number of incommensurate substructures decreases, and there is tendency for decrease of \( \gamma \). The various tin substructures tend to form single crystal islands. It has been observed that Sn(S1) gets far less oxidized than the other tin substructures. SnO(S10) is the common initial oxide observed as islands on all types of thin tin films and in chemically vapour grown tin oxide films (TOF) (e.g. Abstr. ICCS-6, Moscow, 1980, 4, 253; J. Cryst. Growth, 73 (1981) in press). RHEED and DSMS show that there are at least two mechanisms for further oxidation of SnO(S10). The first mechanism is a regular phase transformation of SnO(S10), \( a = 6.42 \pm 0.05 \) Å into tin perovskite (pseudocubic) \( a = 7.40 \pm 0.07 \) Å, or phase transformations of incommensurate SnO(S10) into incommensurate perovskites, resembling the data of CaSnO₃, ASTM 3-0755. The second mechanism resembles very much the oxidation of titanium oxides. The observed interplanar distances in the row of incommensurate SnO structures are very similar to the interplanar distances of the different TiOₓ, as given in the ASTM Tables.

07.2.04 ANALYSIS OF AIR EXPOSED SURFACE OF Cr, Fe and A1. By Fumio Natari and J. M. Cowley, Arizona State University, Dept. of Physics, Tempe, AZ 85281 USA

When the fresh surface of Cr, Fe and A1 is exposed to air at 300°C, an oxide layer is formed over the surface. This is confirmed and its composition and structure can be analyzed by scanning transmission electron microscopy (STEM) with the specimens prepared either outside the microscope or by in-situ evaporation followed by air-exposure. The thin films prepared by evaporation, then exposed to air outside the microscope, had their thickness changed systematically from 10 to 1500 Å. Without use of a supporting film and with the availability of relatively larger uniform area and easier control of thickness, they provide suitable conditions for quantitative analysis. In order to compare the specimens before and after air exposure and to eliminate the possible influence of substrate and water, in-situ evaporation was performed in vacuum better than 1 \( \times 10^{-7} \) Torr. Besides the use of carbon film as substrate, a \( \chi \)-whisker of CuO with about 200Å diameter was also used and metal deposits were crystallized around it. In all these metals, oxide formation was detected by electron energy loss spectroscopy. The increase of oxygen pick-up in aging at 300°C was observed in Fe. The composition of oxide layer is roughly 0.5 and 1 in ratio of cation/anion and the thickness above 10Å and 100Å for Cr and Fe respectively. Microdiffraction with the probe size about 15Å in diameter shows diffuse scattered pattern for some time after specimen preparation, suggesting an amorphous structure. The intensity profile for the initial state of oxide structure was taken from selected area diffraction patterns using the line scan mode. Radial distribution analysis showed the cation-cation nearest neighbor distance to be about 3.4Å for Fe and Cr.