07.X-04 METALLIC-, IONIC- AND INERT GAS MICROCLUSTERS
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Recently, the main problems underlying the experimental study of homonuclear particles with sizes between single atoms and the solid state have been solved: the formation of microclusters, their individual detection and the separation of beams with uniform cluster size. For the first time, agglomerates containing between two and several thousand atoms or molecules have been produced. The measured mass distribution spectra yield information about growth mechanisms, crystallography, magic numbers of the clusters and in the case of double ionisation the critical sizes for Coulomb-explosion.

07.X-05 CRYSTAL STRUCTURE OF THIN SOLID FILMS. By L.I.Man and S.A.Semiletov, Institute of Crystallography of the USSR Academy of Sciences, Moscow, USSR.

Thin solid films of various materials are widely used in modern science and technology. HEED is the main technique for investigation into their structure. There will be given a brief review of the results of such investigations with the emphasis at the correspondence between the structures of thin films and bulk specimens. In the majority of cases thin films and bulk specimens have the same structures. The absence of such a correspondence is due to impurities, inclusions and point defects (vacancies, interstitial atoms) whose concentrations exceed greatly those of equilibrium.
The results will be presented of the investigation into the character of the scattering of high energy electrons in polycrystalline thin solid films of various materials which have been carried out at the electron diffraction laboratory of the Institute of Crystallography of the USSR Academy of Sciences. It will be shown that kinematical theory with due regard for dynamical effects (e.g. after Blackman) can well serve the purposes of electron diffraction structure analysis. The effect of dynamical scattering on the accuracy of structure determination (potential peak heights and atomic coordinates) will be discussed as well as the possible refinement of thin film chemical composition from the potential peak heights in Fourier syntheses.

07.X-06 MAGNETRON SPUTTERING OF COMPOUND FILMS By W.D. Westwood and S. Maniv, Bell-Northern Research, Box 3511, Station C, Ottawa, Ontario, Canada, K1Y 4H7.
Magnetron sputtering for the deposition of thin metal or alloy films has become established in a number of manufacturing processes because it provides high deposition rates at relatively low substrate temperatures. In the electronics, optical and energy industries, there is a need for an economic process for deposition of compounds. For example, Al_2O_3 is used as a dielectric and as an optical waveguide, ZnO is utilized in surface acoustic wave devices, Indium Tin Oxide is employed as a transparent conductor in liquid crystal display panels and as a heat mirror, and CdS, CdSe and amorphous hydrogenated silicon are candidates for solar cell fabrication. Reactive sputtering in magnetron systems has been investigated as a method for high rate deposition of these compounds. Magnetron sputtering offers some distinct advantages but careful control of the parameters is necessary to obtain the required film properties. H_2 can be used as a reactive gas without affecting the sputtering rate provided the ionization in the discharge is sufficiently high. When O_2 is the reactive gas, two stable modes of deposition are normal. In the first, oxygen is used simply as a dopant and does not affect the deposition rate; this has been used to modify the resistivity of CdSe films. In the second mode, an oxide layer forms on the target surface, causing a large decrease in deposition rate but providing fully reacted films; high resistivity ZnO films for SAW devices have been prepared. We have also developed a third mode in which the deposition rate is slightly reduced and the film properties are controlled. This technique has been used to prepare transparent conducting films of defect semiconductors, such as indium tin oxide. These different modes of magnetron sputtering offer new and interesting possibilities for the deposition of compounds.

07.1-01 REAL STRUCTURE CHARACTERIZATION OF PbSeTe CRYSTALS GROWN UNDER MICROGRAVITY CONDITIONS AND ON THE EARTH. By J.Auleytner, J.Bąk, Z.Furmanik, K.Godwod, A.Jędrzejczak, E.Mizera, A.Szczerbakow and T.Warmiński, Institute of Physics, Polish Academy of Sciences, Warsaw, Poland.

The $PbSe_{1-x}Te_x$ crystals were prepared in Space and on the Earth, for comparison, by sublimation of a $PbSe_{0.5}Te_{0.5}$ charge crystal onto a single crystal seed having the same composition. Both seed and charge crystals for the two experiments had been prepared on the Earth from a crystal grown using the vapour phase transport technique. The growth technique (Markov and Davydov, Nieorg. Mat.(1975) 11, 1755)was adapted in the multipurpose apparatus "Crystal" to perform experiments in Space (Malinin and al., Proc. 3rd European Symp., Grenoble, France, (1979) p.5 ESA Sp-142) and on the Earth. The crystal seed, 8 mm in diameter and 2 mm thick with 210 growth direction,was thermally adhered to the base of a cylindrical (with the same diameter) BaF_2 substrate crystal. The seed was fixed in a sealed quartz ampoule, 9 mm in inner diameter and filled with a noble gas, at a distance of 2 cm from the charge. The ampoule walls were not in contact with the crystal. The characterization of the real structure of PbSeTe crystals has been performed using the following X-ray and metallographic techniques: 1) Laue back-reflection method, 2) oscillating film method for the estimation of mosaic structure and dislocation density, 3) oscillating slit method (Auleytner, Acta Phys.Polon. (1971) A39, 379) for topographic imaging of block structure geometry, 4) EDAX and EPMA for a quantitative estimation of chemical composition, 5) metallographic observations. A difference has been found in the block structures of the crystals grown in Space and on the Earth. The latter consisted