GENERAL CONCLUSIONS:

The summary of the observations and the conclusions have already been presented at the end of each chapter and hence only those of a general nature are presented here.

The dislocations manifest themselves in various forms in the growth process of the crystals. In addition to the spirals growth around the screw dislocations, they are responsible for the closed-loop pattern in zinc and the growth triangles in Antimony. Further the supersaturation influences the shape of the growth pattern in zinc. In antimony the size and density of the triangles are increased when the rate of cooling is large.

The cellular structure revealed using the polishing reagent in zinc indicates the importance of the purity of metal in getting a polished surface. A plane surface is never obtained unless the interface is planar and does not exhibit cellular structure. There are many reports of failure of the reported reagents in producing a plane surface after chemical polish. This must therefore be due to difference in the purity of the metal employed. The effectiveness of the method of deep etching in the study of the interface structure has been clearly demonstrated in the various photographs presented in Chapter VII.

The orientation studies reported in chapter V indicates the influence of the various parameters on the process and much more work has to be done in case of Antimony and other metals before the complete theory can be developed about the process.

In the use of chemical method of etching for revealing the dislocation lines on the surface of crystals, an important factor is the choice of the etchant. Slight variations in the composition, as is the case of adding HCl in acetic acid to study dislocations in zinc, affect the process very largely. Also a depending upon the purity of the metal used in the preparation of the crystal, the composition of the etchants has to be modified to produce the desired effect on the metals. This has already been demonstrated by Kosevich on antimony.

Further, the correspondence between etch pits and dislocations is very difficult to establish in metals like zinc. There has been enough evidences that the etch pits are due to dislocations and dislocations produce etch pits, but whether each dislocation produce an etch pit and each pit correspond to dislocation is not yet conclusively proved in zinc. This is due to the nature of the bond existing between atoms in the metals. In this respect, because of the semi-metallic nature, antimony crystals produce better results.

One of the draw backs of the etch method is that it can reveal dislocation lines $\perp$ (perpendicular) to surface only. Further, no isotropy exist between the etch pit density on different planes. The pit size is dependent on the pit density temperature and the state of the etchant.

However, it must be mentioned that the observations presented in this thesis have their own limitations. In the first place most of the work reported in etching are qualitative in nature and except in case of the low angle boundaries in antimony crystals the quantitative estimates are not done. Secondly the effect of the supersaturation on the shapes of the growth features are deduced purely from the circumstantial evidences and the present experimental set up does not permit the quantitative measurements. The origin of the growth features in antimony and the cause of the orientation have not yet been completely understood. There are evidences that these are due to dislocations but, other mechanism such as impurities cannot be completely ruled out. It is possible that all these play their own role either individually or collectively.

The present results indicate that there is a wide scope for further work on the problems discussed in this thesis. The complete study of the growth process from ~~fax~~ vapour phase, with suitable modification of the techniques employed to permit quantitative measurements of super-saturation, temperature and other factors may help to understand the crystal growth in a better way. A detailed study of the plastically deformed crystals, may help us to identify the nature of dislocations mechanism active in these processes.