AN INVESTIGATION OF DISLOCATIONS OF ADP CRYSTALS BY USE OF THE ELECTRONIC MICROSCOPY METHOD

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There are several methods for discovering the places of dislocation exits on the single crystal surface: etching, X- ray diffraction electronic microscopy etc. Except for the electronic microscopy method, the rest of them are based on the secondary effects and consequently, they do not show the immediate dislocation structure. A very significant advantage of the electronic microscopy method as compared to the rest of the above mentioned methods, is that it does not distroy the very place of dislocation exit.

In this paper we present our attempt to discover the places of dislocation exits and to determine their density on the ADP single crystal (100) faces that have grown at the relative supersaturations $0{,}03 \leq \sigma \leq 0{,}09$ and the temperature $T=(23.00 \pm 0.02)^{o}C$, using the method of replica.

The relief of growth features of single crystal (100) faces in a certain moment of growth was preserved by coating the crystal by paraffin oil. The flow of the supersaturated ADP solution was replaced in a given moment by the flow of paraffin oil, which was gradually pushing out the ADP solution from the cell in which the crystal growth was taking place, so that in a certain moment the paraffin oil completely coated the crystal and so conserved its relief of growth features. The paraffin oil was removed from the conserved single crystal by rinsing it out in benzene. Then using the method of evaporation, a palladium-gold-carbon replica was deposited on the crystal. The replica was afterwards removed by dissolving the crystal in water, and then was caught by microscopic grids, dried, and finally observed by means of an electronic microscope.

In Figs. 1. and 2. the typical examples of those faces are shown. In Fig.1 (magnification 25000x) the places of dislocation exits, as well as the face growth layers can be observed, and at the top of it, the interactions of the growth steps which are the cause of defects in crystal growth are observed. The places of dislocation are not clearly discernable due to low relative supersaturation of the solution from which the crystal has

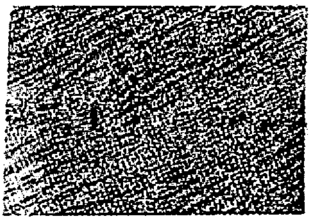

Fig. 1.

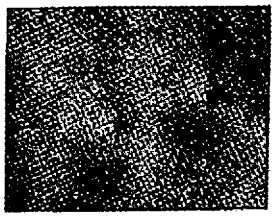

Fig. 2.

grown. In Fig. 2 (magnification 11500x) the dislocation exit places on the crystal surface are clearly discernable because this crystal has grown in the solutions of high supersaturation. In this case, the growth layers are more dense and their interaction more intense, so that consequently there appear great dark and light places in which the growth rates are different.

The dislocation density determined in these experiments is about 10^7 cm^{-2}. This is in agreement with the results obtained by other methods[(1)] and this proves that the exit places of dislocations are really found on the photos.

Reference:

(1) N.A.Pasternak et all., Kristalographia, 14 (1969), 310 (in russian).