THICKNESS DISTRIBUTION AND THE CRYSTAL STRUCTURF OF THE WEHNER´S SPOT

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INTRODUCTION

First observations of anisotropic distribution of sputtered material were reported by Wehner during his investigation of the effects of controlled metal sputtering by low energy Hg ions[1]. The same effect was later observed by other authors with different ion-atom pairs at different energies[2].

In the present paper we have investigated sputtering of Cu monocrystal by A^+ ions, material distribution in the obtained spots and structural characteristics in their particular zones. For our investigation we used the spots lying in <110> direction obtained by sputtering (100) plane of the monocrystal.

RESULTS AND DISCUSSION

The investigation of the spot profile has shown that the Wehner´s spot in the direction <110>, obtained by bombarding a Cu monocrystal by A^+ ions of 18 keV energy and the doze of $1.6 \cdot 10^{18}$ ions/cm^2 has the thickness of 2000 Å in the central part of the spot[3]. Other two investigated regions in the direction from the center of the spot to the periphery, had an average thickness of 1600 Å and 900 Å. The thickness distritution and the crystal structure of the Wehner´s spot are presented in Fig.1.

The recrystallization of the central part of the spot was discovered by transmission electron microscopy. Crystal structure of the spot was quite pronounced in this region. Crystals are irregular in form, with great concentration of defects. Mean grain size is about 800 Å. In the second zone with the spot thickness of about 1600 Å grain size is more homogeneous and the mean crystal size is 450 Å.

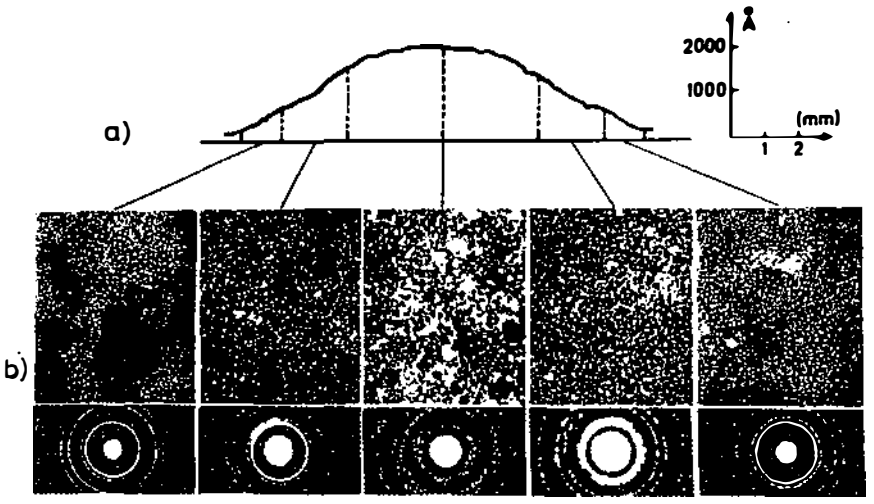

Fig.1. Thickness distribution of the material deposited on the spot(a) and the corresponding cristal structure in the separated zones(b).

On the basis of the experimental results obtained by investigation of the Wehner's spot in the direction 110 obtained by bombarding the (100) plane Cu monocrystal the following conclusions can be made:

- Profilometric investigations show that the thickness distribution of the material deposited on the spot is inhomogeneous. For the energy of 18 keV and the doze of $1.6 \cdot 10^{18}$ ions/cm^2 the thickness in the central part of the spot is about 2000 Å. This thickness is several (2-3) times higher than that on the periphery. It is rather difficult to determine precisely the periphery and the edge of the spot, because of the defocusing effects in the crystal lattice which bring to its spreading.

- The crystal structure in the Wehner's spot changes in the direction from the central zone towards the periphery of the spot. One of the reasons is probably the different deposition rate of the thin film which forms the spot. Though in the whole spot the fraction with the small grain size structure can be found, in the central part of the spot the recrystallization of the deposited material is almost complete.

REFERENCES

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