7. Epitaxy Growth of Metals Deposited on Mica, Calcite, Iceland Spar, Rock Crystal and Glass

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The reactions that reduces ammoniacal silver nitrate sol., or Fehling's sol. depositing Ag or Cu, are common practice in organic chemical analysis. But it is not known whether these deposited metals have oriented structure or not. In this study X-ray Laue method by Cu anticathode were applied for the elucidation of this problem with these deposited metals on mica, calcite, Iceland spar and rock salt face and glass surface.

Ammoniacal silver nitrate sol. was prepared as follows : 8 gr $AgNO_3$ was dissolved in 100 cc H_2O and then added conc. NH_4OH sol. until ppt. disappeared. Into this solution 20 cc H-CHO was added and various minerals were dipped.

As for Fehling's sol. 3.5 gr $CuSO_4 \cdot 5H_2O$ was dissolved in 50cc H_2O, and 7.5 gr Roschell salt in 50cc and into these mixed solution H·CHO was added and several minerals were then dipped.

Laue pattern shows that the Ag deposited on mica cleavage from the sol. of ammonical silver nitrate by adding 8~10 drops of formaldehyde had two <110> fiber axes which intersect at 90° to each other and was found to be under stress. As for the Ag obtained from the sol. by adding 2~5 drops of H·CHO the same axes as above was found with no stress.

Laue pattern of the Ag deposited on rock crystal, calcite, Iceland spar and glass, and the deposited Cu from Fehling's sol. on mica, rock crystal, calcite, Iceland spar and glass show the continuous Debye rings indicating no oriented structure. If the ammoniacal silver nitrate sol. that was added with several drops of H·CHO sol., was evaporated at room temeprature, hair-like silver deposited on the above minerals, but its orientation have not yet been determined.

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8. X-Ray Studies on the Inner Structural Change Due to the Annealing in Aluminium

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In the preceding report, the relation between the reduction percentage and the hardness of the rolled aluminium plates as well as the variation of hardness

with the annealing temperature was discussed. Further, the results of various X-ray analyses concerning those items, the fibre structure of several aluminium plates, the change of recrystallization temperature in accordance with purity and the inner structural change due to the annealing, were reported.

In the present research, a more minute X-ray analysis on the inner structural change due to the annealing in polycrystalline aluminium (99.99% in purity) was carried out by the Laue method, utilizing the heterogeneous X-rays emitted from Cu anticathode. The conditions of the specimens used in this experiment were given in the following table (a special technique was adopted to obtain the Laue pattern from the same place of each specimen, and the annealing and the X-ray exposure were alternated).

No. of Specimens	Purity (%)	Pre-annealing	Reduction (%)	Final Thickness (mm)
A	ditto	450°C, 4 hrs.	80	0.20
B	ditto	ditto	95	0.20
C	ditto	ditto	97	0.20

In A and B, the usual recrystallization phenomenon was observed.

In C, one perfect crystal (strain-free) and some imperfect crystals (strain-rich) which had almost the same crystallographic directions, were observed simultaneously at a lower temperature (at 300°C for 10 min.) and besides, the fibrous arragement of recrystallization was observed at 300°C for 2 hrs. The result of Laue pattern obtained at 300°C for 40 hrs. was almost the same with that obtained at 300°C for 10 min., and also the state at 450°C for 6 hrs. was the same with that at 300°C for 2 hrs. The Laue pattern obtained at 600°C for 30 hrs. was almost the same with that obtained from the so-called single crystal and denoted the same crystallographic direction as at 300°C for 10 min.

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9. Effects of Co-existed Ions on the Inner Structure of Copper Deposited on Zinc Surface from Cupric Sulphate Solution

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In this investigation, 18 and 28 weight percent cupric sulphate solution added 0.03~0.10% HCl, CH_3COOH, H_2SO_4, Na_2SO_4, $NaHSO_4$, $ZnSO_4$ and $FeSO_4$, respectively, were used.