15. Surface Diffusion of Mercury on Tin Foils

Masaaki Yanagisawa
(Hirata Laboratory)

In this studies we used two groups of tin foils reduced from 2 mm to 7μ in thickness. One group A was treated with benzol and ether, the other group B benzol, slightly etched by HCl dil., and subsequently washed in the order of water, alcohol and ether. As more chan 2 days passed between rolling and surface treatment, X-aay Laue photograph of tin foil showed that both samples had already been recrystallised.

Tin foil was down on mercury kept in a dish, and measurements were held in electric thermostatt. From Fick's differential equation of diffusion, using proper boundary conditions of surface diffusion, we obtain $D=y^2/t$, D is surface diffusion constant, y diffusion distance and t time.

We can easily discriminate between diffufed surface and original tin surface. Diffusion constants are as follows:

C°	$D_A\times10^{-4}$	$D_B\times10^{-4}$	°C	$D_A\times10^{-4}$	$D_B\times10^{-4}$
12	2.93	1.31	72	8.52	6.20
25	3.89	1.81	95	11.60	10.20
46	6.34	3.49		(cm^2/sec)	(cm^2/sec)

Thus we obtain $D_A=0.1516\ \exp(-354°/RT)$, $D_B=-1.148\ \exp(-5180/RT)$, Many studies tell that in the case of electrolysis of binary alloys, one component of alloy is enriched to one electrode and the other to opposite side. We applied direct current to surface diffusion by hanging down two tin foils on one dish filled with mercury and made a circuit with battery. In this case, we found that movement of mercury atoms, i. e. acceleration or retardation of diffusion velocity at electrode, can be easily determined in a short time in comparison with ordinary electrolysis. At 12°C, under the condition of 6V-6A, and 6V-2A, diffusion velocity of mercury were accelarated at anode.

But the diffusion velocity at each electrodes is larger than in the case of no current, because of temperature elevation due to Joule's heat.

X-ray photograph by back reflection of diffused surface shows the rings of planes (103), (300) and (003) in hexagonal system (Hg 6-10 %).

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16. Orientation of Products on Rolled Metal Surface

Masaaki Yanagisawa
(Hirata Laboratory)

The study of surface reaction products offers an intersting problem in connection