

THE UNO, HIRATA AND UTZINO SECOND LABORATORIES

Head: Prof. Dr. Senji Utzino

In September, 1930, Professor M. Chikashige, who contributed much to the progress of works of the Institute for Chemical Research, Kyoto University, retired and was succeeded by Prof. D. Uno, one of his students.

Prof. Chikashige attempted to reexamine the ancient alchemy of the Far East in the light of chemistry and metallography, and succeeded in finding an important relation between the colour of alloys and their microstructure.

He examined, furthermore, with X-rays the crystalline configurations of the so-called single crystal in some metals obtained by sublimation as well as the crystalline structure of intermetallic compounds.

With the co-operation of his co-workers, Prof. Uno developed investigations, which were undertaken by the senior director, and introduced dilatometric studies into this country. He studied diffusion between the structural elements of various alloys in the region of solid solution, and invented a method of plating, by diffusion, the beautiful alloys used in ancient Japan, such as *Shakudo* and *Shibuichi*, on the surface of copper and its alloys. Research was also carried out under the guidance of Dr. Hideki Hirata regarding the X-ray analysis of crystalline configurations in some electro-deposited metals.

The titles of some of important contributions of the Laboratory are as follows:
On the Temper Hardenable Alloys.

Influence of Manganese and Magnesium upon Temper Hardening of Light Alloys Belonging to the Co-Cu-Al System.

Cobalt German Silver.

Aluminium Silver Alloys.

On the Kinds of Amorphous Films Produced by Polishing the Surface of Alloys.

Crystalline Growth of Zinc and Cadmium Deposited by Electrolysis.
and others.

In April, 1942, as the result of Prof. Uno's death, his projects were succeeded by Dr. Hirata in the 2nd Laboratory of Prof. S. Horiba. Studies were made of the influence of the heat treatment and mechanical work upon the inner structure of some industrial alloys, and the electronic structure of metals and alloys was also detected.

In December, 1944, the 2nd Laboratory was closed, and a new laboratory was established for Prof. Dr. Hirata, who continued the work which was originated by his senior, the late Professor Uno, and developed excellent X-ray studies on the inner structure of metals and alloys. One of the most important contributions of the Laboratory was a study on the electric structure of alloys, by which the bond structure of metallic atoms of many kinds of intermetallic compounds was detected. In addition to this, the studies on the X-ray examination of the inner structural

changes by raising the temperature of iron, nickel, copper and brass pulverized or rolled mechanically, are also to be noticed: it was confirmed that the recrystallization in these metals took place in two distinct steps by annealing, and such a peculiar phenomenon was inferred to occur in most metals undergone by some severe inner strains.

The results of these are seen in the following publications:

On the Structural Change of Mechanically Pulverized Iron Powder Due to the Procedures of Annealing, by H. Hirata, H. Fujihira and E. Fujii: *Rev. Phys. Chem. Japan, Comm. Vol.*, 86 (1946).

On the Precursory Recrystallization of Metals, by H. Hirata, and M. Yanagisawa: *Rep. Inst. Chem. Res. Kyoto Univ.*, 18, 94, (1949).

On the Precursory Recrystallization in Copper and Brass Foils Prepared by the Mechanical Rolling, by H. Hirata, M. Koyama and K. Yasuda: *Mem. Coll. Sci., Kyoto Univ., A*, 25, 127 (1949).

Moreover, the results of other kinds of investigations appear in the following publications:

On the Inner Structure of Lead and Copper Deposited by the Difference of the Electrolytical Solutional Tension, by K. Yasuda: *Mem. Coll. Sci., Kyoto Univ., A*, 25, 127 (1949).

The Inner Structure of the Calorized Layers on Carbon Steel, by M. Koyama and T. Ishii: *Bull. Inst. Chem. Res., Kyoto Univ.*, 23, 61 (1950).

Surface Diffusion of Mercury on Tin Foils, by M. Yanagisawa: *Ibid.*, 24, 75, (1951).

Orientation of Products on Rolled Metal Surface, by M. Yanagisawa: *Ibid.*, 76 (1951).

After Professor H. Hirata's passing away in December, 1950, many projections of investigation on the inner structure of metals and alloys were passed to the 2nd Laboratory of Prof. Senji Utzino, the present director of the Institute.