dation are greater, if finer oxide and lower temperature of reduction are used. The product can even be pyrophoric. Primary particles or single crystal of tungsten produced by atomic sintering in the course of reduction of tungsten trioxide crystal with hydrogen, are necessarily small, if the reduction is carried out at lower temperatures, because the mobility of tungsten atoms or tungsten oxide molecules is then small. If again the trioxide crystals smaller than to form a single primary particle, the latter is naturally smaller than the ordinary primary particle. The presence of these smaller primary particles is the cause of the reoxidability of the tungsten powder. The spontaneous reoxidation of metallic tungsten powder at room temperature would be worth more attention in the tungsten powder metallurgy.

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13. On the "Precursory Recrystallization" in Copper Foils Prepared by the Mechanical Rolling.

Hideki Hirata, Masashige Koyama and *Katsuyuki Yasuda.*

A peculiar phenomenon as may be called a "Precursory Recrystallization", which had been found in our foregoing investigation with iron and nickel, pulverized (Rev. Phys. Chem. Japan, Commemoration Vol. 86 (1946)), or rolled (Rep. Inst. Chem. Research, Kyoto Univ., 18, 94 (1914)) mechanically, was inferred to occur in the most metals affected by some severe inner strain. To make it clear whether such an inference were correct or not, the progress of the structural change due to the various procedures of annealing of some copper foil (reduction percentages in thickness amount to 62.7%~99.89%) was examined with X-rays similarly as in the previous experiments.

As the consequence of the present X-ray examination, it was confirmed that the usual recrystallization phenomenon in all the copper foils examined, takes place at a temperature 100°C~250°C, irrespectively of the duration of annealing (2 min.~5 hr.); i.e., at the temperature above stated, the growth of micro-crystals forming these foils, which had arranged themselves in a fibrous way, was observed to take place, together with the conversion of the fibrous from ⟨111⟩ axis to ⟨100⟩ axis parallel to the direction of rolling.

Among these foils, those corresponding to the reduction percentages 97.31%~99.68% were especially noticed to give rise to the "P. R." at a temperature 50°C~120°C. By this "P. R.", two fibrous arrangements, each having ⟨111⟩ axis of the micro-crystals in common, were seen to be newly formed. One of these had its common axis parallel fo the direction of rolling; while in the other, its common axis was seen to be situated normal to the aforesaid direction. Here, it must be remarked that such a structural change due to the "P. R." was also observed to be given rise by aging these foils at room temperature for a few days.

Moreover, the reason why the "P. R." could hardly be detected with the foils, which had been worked more severely than those displaying this phenomenon, was confirmed by the further examinations to be due to the occurrence of the "P. R." in the very midst of the procedure of rolling.

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14. On Equilibrium Relation between C, Si in Pig Iron and Slag under One Atomospheric Pressure of Carbon Monoxide Gas.

Hiroshi Sawamura and *Jun Sawamura.*

In case of production of pig iron in blast furnace, the equilibrium relation between pig iron and slag is the most important factor. Therefore, we determined at 1400°C the equilibrium relation between C, Si in pig iron and SiO_2-CaO-Al_2O_3 system slag under one atm. pressure of carbon monoxide gas.

The carbon monoxide gas, which is produced by dropping formic acid into hot conc. sulphuric acid, previously purified, is fed into a hard porcelain tube. Together with the artificial slag and proper quantity of metalic silicon, the sample, which was prepared from a high carbon white pig iron is melted in a graphite crucible, placed in the above mentioned porcelain tube. Temperature is measured by the optical pyrometer. Now the graphite crucible is taken out from porcelain tube, and is cooled in water as soon as possible. At first, we determined the duration of time which pig and slag needed to reach the equilibrium, Next we determined the equilibrium relation between the pig and several kinds of slags.

It is found that the time when pig and slag reach the equilibrium is 2.5 hours on the first experiment, while on the next experiment we find that the higher the the basicity of slag, the larger the solubility of carbon in pig iron and the smaller the solubility of silicon in it. Thus from the above results we get the answer of the equilibrium relation between carbon and silicon in pig iron at 1400°C.

The above results are considerably different from those reported by Mr. Mukaiyama, Messrs. Koide and Otani, and Messrs. Schichtel and Piwowarsky. Some considerations on this cause have been made. Our next step is to carry out the similar experiments at 1,500°C and 1,600°C respectively, to see the influence of heat on their equilibrium relation.
