For carbon, the position was not changed, although the curve may be broadened somewhat. Aging curves after water quenching, normalizing, and furnace cooling are given. The fixation of nitrogen by means of aluminum is illustrated, and further the inclination of nitrogen to stay in supersaturated solid solution, even at rather slow rates of cooling, in some steels is shown.

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Technical Note

Twinning in Silicon

by E. I. Salkovitz and F. W. von Batchelder

AS Slawson¹ and others have already shown, from a geometrical view twinning in the diamond structure may be considered as a reflection across a (111) plane or as a reflection across a (112) plane. An analysis by Ellis and Treuting² showed that the twinning plane must be the (111) plane, but that a twin might have lateral boundaries along (112) planes. Earlier Slawson¹ and Ellis³ had shown that only (111) twinning was present in diamond and germanium respectively.

Since an ingot of silicon, 1 in. in diam and 1½ in. long, prepared from Dupont silicon to which 0.2 pct Be had been added was available, it was examined for twinning. The ingot had been cooled slowly from the bottom. A section 1/16 in. thick was ground off from the bottom and then the ingot was sliced vertically through the center. Spectrographic analysis indicated only faint traces of iron and silver, in addition to the beryllium.

The sample was first etched with a hot solution of 10 pct NaOH in water and photographed. Back-reflection Laue patterns were made of the vertical and horizontal sections in the regions designated in Fig. 1. Orientations were obtained for each twin using the Greninger technique. Several regions of the same orientation were found; thus regions A and K were identical, similarly N and P, and C, G, J, and L. Knowing the angles between the traces of the twinning plane on the surface and the specimen axis, the indices of the twinning plane were deduced. In all cases the twinning plane was found to be (111); lateral boundaries, however, were found which were (112) such as the one indicated in Fig. 1. Therefore, as in the case of diamond¹ and germanium³ only (111) twinning occurs in silicon.

We wish to thank Mr. Hino for the use of the ingot as well as for its metallographic preparation.

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Fig. 1—Plan and elevation of etched silicon ingot.

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