86. Cathode-Ray Investigation of the Surface Oxidation of Zincblende.

By Ryozi UYEDA, Satio TAKAGI and Hitosi HAGIHARA.

Physical Institute, Tokyo Imperial University.

(Comm. by S. NISHIKAWA, M.I.A., Oct. 12, 1940.)

The surface oxidation of zincblende was first investigated by means of cathode-rays by Yamaguti¹⁾ and later by Aminoff and Broomé.²⁾ The latter investigators studied the orientation of zinc oxide crystals on the cleavage and natural faces of zincblende. They observed the same type of orientation on the positive and negative tetrahedral surfaces, although the perfectness of orientation was different on these surfaces. In the present experiment a similar investigation was carried out with artificially prepared surfaces and the type of orientation was confirmed to be distinctly different on each tetrahedral surface.

A pair of positive and negative tetrahedral surfaces were cut from a block of zincblende crystal and their signs were decided by measurement of piezo-electricity. They were polished carefully, etched with nitric acid and heated in air to red hotness for several minutes. On cooling, they showed beautiful colours of interference. The pair of specimens thus prepared were examined by the reflexion method of cathode-ray diffraction. Examples of the diffraction patterns due to these specimens are reproduced in Fig. 1. From analyses of the patterns obtained at various azimuths, the orientation of zinc oxide on these surfaces was determined as shown in Table I and illustrated schematically in Fig. 2. These orientations were confirmed with several pairs of specimens.

Fig. 1. Zinc oxide on tetrahedral surface.

Direction of incident beam is shown
by arrows in Fig. 2.

1) Yamaguti, Proc. Phys.-Math. Soc. Jap., **17** (1935), 443.

2) Aminoff and Broomé, Kungl. Sv. Vet. Akademiens Handlingar, **16** (1938), 3.

TABLE I.

Sign of tetrahedral surface	Orientation	
	First direction	Second direction
Positive	$[0001]_{\text{ZnO}} \parallel [111]_{\text{ZnS}}$	$[10\bar{1}0]_{\text{ZnO}} \parallel [\bar{1}10]_{\text{ZnS}}$
Negative	$[0001]_{\text{ZnO}} \parallel \begin{cases} [\bar{1}\bar{1}\bar{1}]_{\text{ZnS}} \\ [\bar{1}1\bar{1}]_{\text{ZnS}} \\ [\bar{1}\bar{1}1]_{\text{ZnS}} \end{cases}$	$[10\bar{1}0]_{\text{ZnO}} \parallel \begin{cases} [110]_{\text{ZnS}} \\ [011]_{\text{ZnS}} \\ [101]_{\text{ZnS}} \end{cases}$

Fig. 2. Orientation of zinc oxide on tetrahedral surface.

Although it might be too hasty to compare these results directly as others used natural faces while we used etched ones, the present result is not in accordance with those of previous investigators. Further investigation is now being carried on.

In conclusion the authors express their sincere thanks to Professor S. Nishikawa for his kind guidance throughout this work.