non-polarisable electrodes were immersed. The electrodes were connected through a suitable amplifier to a cathode ray oscillograph. In the input circuit was included a high value of grid leak and a D.C. potentiometer or an A.C. oscillator. Occasionally, in place of the potentiometer two different solutions were employed, giving rise to a diffusion or phase boundary potential.

As the bubble film became thinner, it was observed in the case of several liquids (such as carbon tetrachloride, olive oil) that *the* D.C. *conductance changed abruptly from a barely detectable value to a measurable one, and continued to increase in definite steps* until the bubble eventually burst. In the same instances the A.C. *conductance varied, but this was* more continuous. The oscillograms reproduced (Fig. 1) will illustrate this behaviour. $0\cdot1\,N$ KCl was used on both sides of the film.

In other cases, for example, using nitrobenzene, in spite of symmetrical leads and the absence of any current polarisation, it was noted that an 'asymmetry potential' was developed, changing in a characteristic manner as the interfacial non-aqueous film became thinner.

A more detailed account of these observations and of other electrical phenomena in interfacial films of this type will be given elsewhere.

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Oxidation of Single Crystals of Zinc Sulphide studied by Electron Diffraction

CRYSTALS of sphalerite were heated in air until covered by a thin film showing interference colours. These crystals were photographed in an electron diffraction camera, which will be described elsewhere. The angle between the incident beam and the crystal face was very small. The wave-length was 0·053 A. (calibrated from a powder photograph of MgO and a transmission photograph of MoS_2). The distance between the crystal edge and the photographic plate was 303·5 mm. Figs. 1, 2 and 3 represent the diffraction patterns in three different cases. In Figs. 1 and 2 the oxidised face was (111), and the incident beam was perpendicular (Fig. 1) and parallel (Fig. 2) to the octahedron edge. By photographing along two different octahedron edges the same pattern was obtained. In Fig. 3 the oxidised face was (110), and the incident beam was perpendicular to the cleavage edge [001]. This direction is in fact parallel to an octahedron edge. The diffraction patterns are all of the transmission type, on which is superposed a faint powder photograph. They form a series of photographs such as would be expected if we had photographed a *single crystal structure in different directions*, the crystal having for each direction of the incident beam the form and dimensions necessary for obtaining a point pattern.

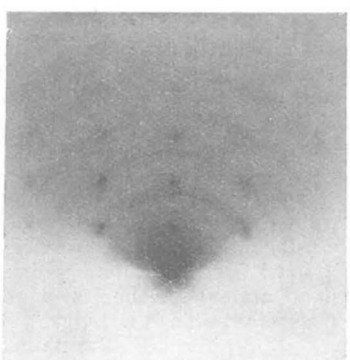

FIG. 1.

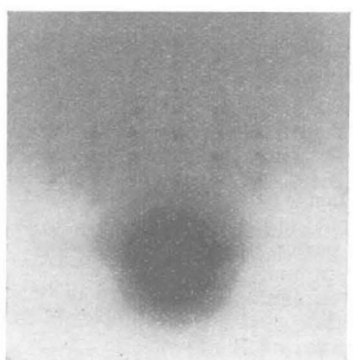

FIG. 2.

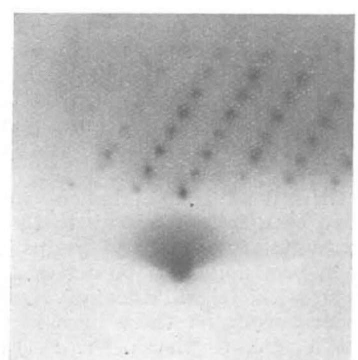

FIG. 3.

The structure which has given rise to these point patterns is hexagonal and is so orientated that the c-axis is perpendicular to the octahedron face and the a-edge parallel to the octahedron edge. The same position in relation to the ZnS structure is observed on the cleavage plane (110), where the hexagonal c-axis should make an angle of 35° 16′ with the normal to the plane (110) (compare Fig. 3, which actually shows the same pattern as Fig. 2, but inclined to it at 35°). The dimensions are: $a = 3\cdot30$ A., $c = 5\cdot27$ A., $c/a = 1\cdot60$. For chemical reasons we assume the film photographed to consist of zinc oxide (ZnO). The dimensions of ordinary zinc oxide[1] ($a = 3\cdot24$ A., $c = 5\cdot19$ A., $c/a = 1\cdot60$) are, as a matter of fact, very near to those observed.

Assuming the structure to be ZnO, we observe that forbidden reflections (for example, $(000l)$ in odd orders) occur in Figs. 2 and 3 (along the hexagonal a-axis). On photographs perpendicular to the octahedron edge, on the other hand, no forbidden reflections occur (Fig. 1). A discussion proves that these observations cannot be explained by assuming an aggregate of crystallites in slightly different positions (superposition of several planes of the reciprocal lattice). The assumption of 'repeated reflections'[2], however, can explain the presence of the forbidden reflections in Fig. 2 and is not incompatible with the absence of forbidden reflections in Fig. 1. This assumption seems to be the only one capable of explaining the striking fact that certain forbidden reflections are present in one type of photographs but absent in the other (odd orders of $(000l)$).

It should be observed that in all the photographs (from different crystals) typical point patterns appear. There is consequently no reason to suppose that this is due to a few isolated small crystals, which are by chance hit by the incident beam. On the contrary, it seems necessary to assume that everywhere in the film the conditions requisite for the appearance of a point pattern exist.

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[1] C. W. Bunn, *Proc. Phys. Soc. London*, 47, 835 (1935).

[2] Compare H. Raether's application of Bethe's theory in *Z. Phys.*, 78, 536 (1932).