

For the hkl reflexions this becomes

$$c_{\text{obs.}}^{*2} = c^{*2} - (2h^2/l^2)(a^*\delta a^* + b^*\delta b^*),$$

and the correct value for c^{*2} may be obtained by plotting $c_{\text{obs.}}^{*2}$ against h^2/l^2 for such reflexions. Similar considerations may be applied to a^* and b^* .

Fig. 1 gives an example of the application of the

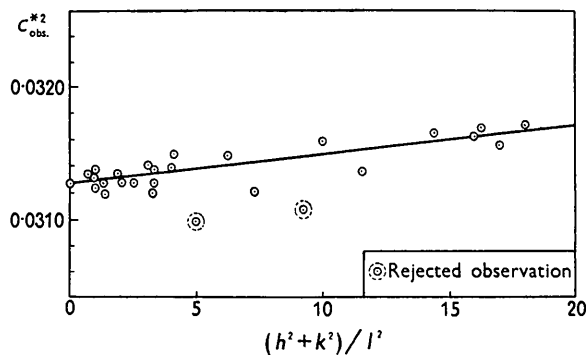


Fig. 1. Plot of $c_{\text{obs.}}^{*2}$ against $\{(h^2+k^2)/l^2\}$ for β -uranium.

method to the determination of the c dimension of β -uranium. The values of the unit-cell dimensions of this material at 720°C . are (Thewlis, 1951, 1952)

$$a = 10.759 \pm 0.001, \quad c = 5.656 \pm 0.001 \text{ \AA}.$$

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The orientation of silver formed during electron bombardment of silver halides. By D. W. PASHLEY, *Physics Department, Imperial College, London S.W.7, England*

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Trillat (1951, 1952) has recently published results of an electron-diffraction study of the growth of silver which occurs during electron bombardment of thin films of oriented silver bromide (in transmission experiments). These results lead him to conclude that the silver produced during the bombardment is randomly oriented with respect to the orientation of the bromide. This is in apparent contradiction with reflexion experiments (electron diffraction) carried out by the author (Pashley, 1950, 1951, p. 39), who finds a prominent parallel orientation of silver in both silver bromide and silver chloride.

It could be argued that this parallel orientation was caused by the single-crystal substrates (mica, rocksalt etc.) on which the silver halide was supported during the bombardment. This point has been carefully considered, and checked by experiments such as the following. Silver bromide was deposited on to potassium bromide cleavage faces in two different ways: (1) with a parallel orientation between the substrate and the deposit; (2) with (111) silver bromide planes parallel to the (100) potassium bromide cleavage surface (for details see Pashley, 1952). In each case electron bombardment of the specimens caused growth of silver oriented parallel to the silver bromide. The orientation of the silver with respect to the potassium bromide was thus different in the two cases, and it therefore follows that the substrate was not responsible for initiating the orientation of the silver.

In drawing Fig. 1 a deliberately incorrect choice of a was made, the value being taken as 10.772 \AA . The value of c^{*2} obtained is 0.03127 . This corresponds to $c = 5.655 \text{ \AA}$, which is in satisfactory agreement with the author's previous value.

As already mentioned, the value of a^* , and hence a , can be found from the slope of the line in Fig. 1.

From equation (2), the slope is $-2a^*\delta a^*$. From this a value for δa^* may be obtained by putting in the value of a^* . This is not known, however, but a moment's consideration will show that it is legitimate to insert the assumed value of a^* . The slope is positive (its value is actually 0.000022), hence δa^* is negative and the assumed value of a^* is too small, i.e. that of a is too high.

$$\text{We now have } \delta a^* = -\frac{0.000022}{2a^*_{\text{assumed}}} = -0.000118.$$

This reduces the value of a from that assumed, i.e. 10.772 \AA , to 10.758 \AA , which again is in satisfactory agreement with the author's previous value.

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References

- BACON, G. E. (1948). *Acta Cryst.* 1, 337.
 COHEN, M. U. (1935). *Rev. Sci. Instrum.* 6, 68.
 THEWLIS, J. (1951). *Nature, Lond.* 168, 198.
 THEWLIS, J. (1952). *Acta Cryst.* 5, 790.

A more detailed account of these results will be given later.

Trillat's experiments with detached thin films have been repeated by the author, with both silver bromide and silver chloride. It is found that although much randomly oriented silver is formed, some parallel oriented silver also forms, particularly in the case of silver chloride. In addition, the silver halide becomes appreciably disoriented during electron bombardment, giving halide diffraction rings. At least one such ring is also visible on Fig. 6 of Trillat's paper (1952). Subsequent decomposition of this disoriented halide will give rise to randomly oriented silver, which might be sufficient to mask the appearance of oriented silver. No such disorientation of the halide occurs with layers supported on substrates.

It is therefore to be concluded that the formation of parallel oriented silver is a genuine effect of the decomposition of silver bromide and silver chloride.

References

- PASHLEY, D. W. (1950). *Acta Cryst.* 3, 163.
 PASHLEY, D. W. (1951). *Fundamental Mechanisms of Photographic Sensitivity*. London: Butterworths.
 PASHLEY, D. W. (1952). *Proc. Phys. Soc. A*, 65, 33.
 TRILLAT, J. J. (1951). *C. R. Acad. Sci., Paris*, 233, 1188.
 TRILLAT, J. J. (1952). *Acta Cryst.* 5, 471.