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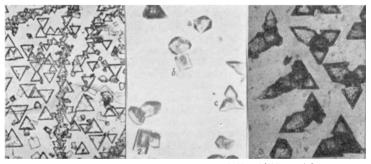[3] Wilkins, M. H. F., Gosling, R. G., and Seeds, W. E., *Nature*, **167**, 759 (1951).

Epitaxis of Rubidium Iodide on a Barium Stearate Substrate Deposited on Mica

THE oriented overgrowth formed by rubidium iodide on a mica substrate has been recorded by Royer[1] and others. In the course of repeating these experiments the substrate was modified; instead of a muscovite substrate, barium stearate deposited on freshly cleaved muscovite was used, the deposit being built up as a succession of monomolecular layers.

Rubidium iodide crystallizing from an aqueous solution on a substrate of glass or of barium stearate (one to nine molecular layers) on glass does so in the cubic habit, whereas on mica the crystal outline is in most cases an equilateral triangle with sides parallel to the traces of the (010), (110) and ($\bar{1}$10) planes of mica, the (111) plane of rubidium iodide being parallel to the (001) plane of mica. Some crystals, however, assume the cubic habit in random orientation with respect to the mica; but if dilute solutions are used their number is very much reduced. If the crystallization is carried out on barium stearate layers deposited on the mica, the proportion of unoriented cubic crystals increases with the thickness of the barium stearate barrier.

Layers of one, three, five, six, seven and nine monolayers were used, and with nine layers oriented crystals only occasionally appeared. It appeared, therefore, that a barium stearate barrier of nine molecules thick was sufficient to eliminate the influence of the mica.

In the (111) plane of rubidium iodide, the directions of greatest atom density are those which form the boundaries of the triangular crystals. The directions next to these in atom density would outline a hexagon; hexagonal crystals, which are absent when rubidium iodide crystallized directly on mica, appeared when a barrier of barium stearate of three, five or seven layers was interposed; also the triangular crystals frequently grew in connected groups of three, especially when deposition was on a monomolecular barrier.

The layers of barium stearate were deposited by dipping a freshly cleaved mica slip, c. 50 mm. × 7·5 mm., through a monomolecular layer of barium stearate spread on a water surface, the technique being that described by Blodgett[2].

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Intense Gallium X-Rays for Microradiography and Diffraction Investigations

THE identification of segregates in ferrous and non-ferrous alloys by the technique of microradiography[1-4] is now established as an extremely valuable complement to the conventional optical micrographic procedures. The contrast between segregate and matrix is independent of the etching characteristics of the metal, but depends, instead, on the relative absorption of the X-ray beam through a finite depth of specimen. Since the linear absorption coefficient μ is $C \cdot N^4\rho\lambda^3$, where N is the atomic number of the absorbing element, ρ its density, λ the wave-length of X-rays and C a constant between absorption edges, it follows that, provided suitable wave-lengths are available, a segregated element may be positively identified by X-ray methods alone. When it is sought to distinguish between two elements close to each other in atomic number, it is possible to accentuate the contrast in X-ray absorption by choosing a radiation with a wave-length lying between the K-absorption edges of the elements.

For the bulk of alloys normally investigated, the range of wave-lengths available for microradiographic examination is, on the whole, quite adequate, with the exception of the commercially important group which comprises the brasses. As shown in the accompanying table, the only radiation capable of discriminating satisfactorily between copper and zinc-rich segregates is the $K\alpha$-radiation of gallium, and this radiation has hitherto not been available.

On account of its extremely low melting point (29·75° C.), it would be impossible to employ gallium as a target material in the normal types of sealed-off or demountable X-ray tubes, unless the current were kept down to a few micro-amperes. This in its turn, would make exposure periods inordinately long and quite impracticable except for very special purposes. However, the situation is quite different when a rotating anode X-ray tube is employed. By carefully

(1) Rubidium iodide crystals grown on mica. (2) Rubidium iodide crystals grown on a three-molecule layer of barium stearate deposited on mica, showing the development of hexagonal outlines (a), an unoriented cubic crystal (b), and a connected group of three (c). (3) Connected groups of three crystals growing on a monolayer of barium stearate on mica. In each photograph the longest side is parallel to the b-axis of the mica, and the magnification × 60