

ON THE APPEARANCE OF WAVY GLIDE LINES IN SILVER CHLORIDE CRYSTALS

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Abstract

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CRYSTALLOGRAPHY

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As is known (($\sim\{1,2\}$)), silver chloride crystals, in their mechanical properties, are very similar to metal crystals. In particular, the process of appearance and development of glide lines in silver chloride proceeds in complete analogy with the same process in metals. It is also known that in metals, along with straight glide lines, curved, wavy glide lines are often observed, the cause of whose appearance is still not entirely clear (see, for example, (($\sim\{3\}$))).

We investigated the appearance of glide lines during the stretching of polycrystalline plates, monocrystalline through their thickness and thin (tenths of a millimeter), of silver chloride, obtained as a result of pressing and rolling a single crystal and subsequent annealing leading to recrystallization. The process of plastic deformation in individual grains of such a polycrystalline plate is characterized by the appearance of thin glide lines, clearly visible both in transmitted and in reflected light. With successive increase of the load these lines gradually lengthen, branch, and their number increases. In one and the same grain the lines run parallel to one another. With further increase of the load a second system of lines often appears, intersecting the lines of the first system.

In different grains of one and the same specimen, systems of both straight and curved, wavy lines may arise. The cause of the appearance of wavy lines long remained puzzling to us, until we succeeded in noticing the initial stage of formation of such lines.

The photograph (see Fig. 1) shows that at the initial stage of the process of plastic deformation a curved glide line is not yet visible: first there arises a series of strokes, i.e., short segments of straight glide lines, parallel to one another. With successive increase of the load these segments slightly lengthen and thicken (see Fig. 2) and eventually merge, forming a curved glide line. Such a line is visible in the photograph in Fig. 3, taken from the same region of the crystal after the specimen had been left under a constant load for 6 days. Traces of the individual strokes on the curved glide line that has formed are already difficult to distinguish. All photographs were taken in reflected light, (600 \times).

In most cases this initial stage proceeds so rapidly that it cannot be detected. However, careful study of already formed curved glide lines on many specimens of silver chloride crystals shows that it is almost always possible to distinguish

traces of straight strokes, as a result of the merging of which the curved line arose. This compels us to suggest that the primary process in the formation of glide lines on silver chloride crystals is always the appearance of straight glide lines.

Only subsequently, upon the merging of these lines, do sinuous lines arise. How this merging occurs is still unclear to us.

The similarity of the processes of plastic deformation in silver chloride crystals and in metals makes it possible to suggest that, perhaps, sinuous glide lines in metals also arise as a result of the merging of a number of rectilinear glide lines.

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REFERENCES

¹ A. W. Stepanow, *Sov. Phys.*, **6**, 312 (1934); **8**, 25 (1935); . . . , **19**, 205 (1949).

² R. D. Moeller, F. W. Schonfeld, C. R. Tipton, J. T. Waber, *Trans. Am. Soc. Met.*, **43**, 28 (1951).

³ R. Madding, N. K. Chen, *Progr. Met. Phys.*, **5**, 53 (1954).

Fig. 1

Fig. 2

Fig. 3

Fig. 1. Initial stage of the process of plastic deformation. Appearance of strokes, i.e., short segments of straight glide lines parallel to one another

Fig. 2. Thickening and lengthening of the strokes as the load applied to the specimen increases

Fig. 3. Glide lines formed from individual strokes after the specimen had been left under a constant load for 6 days

Note: Figure translations are in progress. See original paper for figures.

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