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Technical Note

Preferential Etch for Use in Optical Determination Of Germanium Crystal Orientation

by R. H. Wynne and Colman Goldberg

WHEN using an optical goniometer to determine crystal orientation¹ it is advantageous to use a preferential etchant so that the etch pits have plane faces which are parallel to crystallographic planes, all of which are of the same "form."

"Westinghouse Silver Etch" (WAg), a preferential etch for germanium, is made up as follows: 40 ml of 49.7 pct hydrofluoric acid, 20 ml of 70.7 pct nitric acid, and 40 ml of distilled water containing 2.0 g of silver nitrate. Examination of metallographs of WAg etched surfaces (Fig. 1, for example) indicates that, regardless of crystal orientation, the faces of the etch pits are (111) surfaces. Optical goniometer examination of these WAg etched surfaces also indicates that the faces of the etch pits are (111) surfaces, i.e., all bright reflections are from (111) planes.

When using an optical goniometer of the type described by Barrett,¹ not only (111) reflections from a WAg etched germanium surface but also other reflections of lower intensity will be observed. These latter reflections can cause confusion. We have used an optical goniometer made from a war surplus astrocompass and a galvanometer lamp. The reflections are observed by using the goniometer in a darkened room and letting the reflected light be in-



Fig. 1—WAg etched germanium surface. Approximately (111) orientation.

cident upon a piece of white paper. The resulting decrease of goniometer sensitivity enables (111) reflections only to be observed. This in turn permits the crystal orientation to be determined in a matter of minutes, since only two measurements are necessary.

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R. H. WYNNE and C. GOLDBERG are associated with the Electronics and Nuclear Physics Dept., Westinghouse Research Laboratories, East Pittsburgh, Pa.

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