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Discussion of this paper sent (2 copies) to AIME by Mar. 1, 1957 will appear in *AIME Transactions* Vol. 209, 1957, and in *JOURNAL OF METALS*, October 1957.

Technical Note

Effects of Aluminum on the Cold-Rolled Textures of Titanium

by C. J. Sparks, Jr., C. J. McHargue, and J. P. Hammond

IN a study of the effects of solid solution alloying on the deformation texture of titanium, an alloy containing 3.8 pct Al was found to develop a (0001) [10 $\bar{1}$ 0] texture instead of the texture characteristic of pure titanium.^{1,2} A short investigation has been made of the change in texture with aluminum content.

Alloys containing 0.27, 0.47, 1.05, and 1.43 pct Al were prepared by vacuum arc melting, using iodide titanium as the base material. Homogenized ingots were reduced 90 pct in thickness by cold rolling. Pole figures were obtained using the usual film techniques.

Fig. 1 shows that the change from the tilted to the nontilted (0001) position is gradual. The dashed contour lines in Fig. 1 indicate the extent to which data was collected. The addition of 0.27 pct Al resulted in a decrease in the transverse spread of basal poles. With increasing aluminum content, the amount of the tilt becomes less and the region of highest intensity takes the shape of a ring about the center of the pole figure. For aluminum contents greater than 1 pct, the (0001) [10 $\bar{1}$ 0] texture is definitely present—the sharpness increasing as the amount of solute is increased.*

* Future experiments planned on a Ti-3 pct Al alloy, using quantitative pole figure methods, should definitely establish if the maximum intensity region about the center of the pole figure remains as a ring or is solid.

It is interesting to note that Williams and Eppelsheimer³ reported for commercial grade titanium a high intensity region 20° toward the rolling direction from the rolling plane normal in addition to one 30° toward the transverse direction. Their basal pole figure was similar to Fig. 1, row three. The observation that the texture changes gradually with solute concentration is similar to the results of similar studies on copper.⁴ At the present time these effects are not clearly understood.

Acknowledgments

This work was sponsored by the Aeronautical Research Laboratory (WCRRL), Wright Air Development Center, under Contract No. AF 33(038)-19574. The authors are grateful for the aid received and permission to publish these results.

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TN 359E. Manuscript, Jan. 23, 1956.

Fig. 1—Basal pole figures (0002) showing effect of aluminum on titanium in changing from split to nonsplit texture.

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