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Role of alloying addition and deformation mechanisms on the evolution of texture in α-β titanium alloys

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Investigations into the hot deformation on the evolution of texture and microstructure have been conducted on Ti-6Al-4V due to its large production for many applications. The present study focuses on understanding the deformation mechanisms through the characterization of the microstructure and texture in hot rolled α-β titanium alloys with the addition of V, Fe, and Ge to Ti-6Al-4V. Changes in the phase fraction and formation of Ti_5Ge_3 precipitates control the strain partitioning and localized deformation. An increase in the beta phase fraction from less than 10 pct. (Ti-6Al-4V) to 45 pct. (Ti-6Al-5V-1Fe-2Ge) modifies strain accumulation and these changes were monitored through the measurement of orientation gradients. Slip trace analysis indicates an enhancement in the activity of pyramidal slip system due to alloying additions. A reduction in the difference between critical resolved shear stresses among basal, prism and pyramidal slip system is attributed for the observed slip activity.

Keywords: α-β Ti alloys; EBSD; texture; slip trace analysis;

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