

## Phase transformation cycle $\beta \rightarrow \alpha' + \alpha + \alpha'' \rightarrow \beta$ in Ti6Al4V alloy

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### Abstract

The  $\beta$ -phase transforms to  $\alpha'$ ,  $\alpha$  and  $\alpha''$  within a range of temperature from the  $\beta$ -transus ( $T_\beta$ ) to about 600°C, considering no external stress is applied. Two types of microstructure were obtained: acicular martensite when rapidly cooled and lamellar  $\alpha/\beta$  when slowly cooled from the  $\beta$  phase field. The sequential transformation of  $\beta$  into  $\alpha'$ ,  $\alpha$ -phase,  $\alpha_2$ , and  $\alpha''$  was revealed as peaks on the coefficient thermal expansion (CTE) curves, however, reversed transformations:  $\alpha'' \rightarrow \beta$ , and  $\alpha \rightarrow \beta$ , were revealed by the DSC thermograms. The presence of  $\beta$ ,  $\alpha'$ ,  $\alpha$ ,  $\alpha_2$  and  $\alpha''$  was identified by means of XRD analysis and HRTEM.