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In-situ characterization of growth of isothermal ω-phase in metastable β-Ti alloy TIMETAL LCB

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Metastable β-Ti alloys exhibit various solid-solid phase transitions. Our study is focused on the characterization of the diffusion controlled $\beta \rightarrow \omega_{iso}$ phase transition. The particles of ω phase play an important part in thermomechanical treatment since they serve as heterogeneous nucleation sites for precipitation of finely dispersed particles of hexagonal α phase. The in-situ observation of the growth of particles of ω phase could be difficult by conventional techniques. However, it was shown recently that the ω phase significantly influences the elastic constants of the material, and the different forms of ω phase have different effects on the elastic anisotropy, as well as on the internal friction coefficients [1]. Therefore, the $\beta \rightarrow \omega$ phase transformation could be in-situ observed by the precise measurement of elastic constants [2]. In this contribution, we present the study of the kinetics of the $\beta \rightarrow \omega_{iso}$ phase transformation by resonant ultrasound spectroscopy. The polycrystalline samples of TIMETAL LCB alloy were examined by this technique during isothermal and non-isothermal ageing at temperatures up to 300°C. The experiment was complemented by the phase-field model that helped to explain the measured data.

Keywords: Phase transitions, elasticity, resonant ultrasound spectroscopy.

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