Abstract:
In the present work, phase transformations in TIMETAL LCB titanium alloy and their influence on mechanical properties were studied. Different initial conditions were prepared by solution treating above β-transus immediately followed by heat treatment in α/β temperature regime. These resulted in different grain boundary α thicknesses and contiguities at a fixed α volume fraction. The subsequent ageing response of this material was studied by low temperature ageing at 400 °C, 450 °C and 500 °C. Phase transformations were studied by X-ray diffraction (XRD), scanning electron microscopy (SEM), differential scanning calorimetry (DSC) and resistivity measurements. Mechanical properties were investigated using microhardness measurements and tensile tests. It has been proved that metastable ω phase is formed during annealing at 400 °C and 450 °C. ω particles further transform to very fine precipitates of α phase when exposed to annealing for longer time periods. These fine precipitates significantly contribute to increase of microhardness and achieving high value of yield stress.

Keywords:
Metastable beta Ti alloys, phase transformations, microstructure changes, ω phase