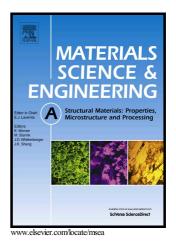
# Author's Accepted Manuscript

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# **ACCEPTED MANUSCRIPT**

# A microstructure with improved thermal stability and creep resistance in a novel near-alpha titanium alloy

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#### Abstract

A triple-microstructure with the precipitation of silicide along the  $\alpha/\beta$  phase boundaries and  $\alpha_2$ phase in the Ti-5.8Al-3Sn-5Zr-0.5Mo-1.0Nb-1.0Ta-0.4Si-0.2Er alloy was prepared for improving thermal stability and creep resistance. The alloys were forged at 1050 °C and 1000 °C followed by solution treatment at 1000 °C for 1 h and subsequent ageing at 700 °C for 5 h. The effects of a morphology and precipitation characteristics on the thermal stability and creep performance of high-temperature titanium alloy were investigated. A triple-microstructure with the participation of silicide along the  $\alpha/\beta$  phase boundary and  $\alpha_2$  phase was a promising structure with improved thermal stability and creep resistance. The plasticity loss rate was 25.0% after thermal exposure at 650 °C for 100 h due to the participation and coarsening of  $\alpha_2$  and silicide. Meanwhile, the plastic creep strain was 0.111% during the creep deformation at 650 °C for 100 h with an applied stress of 100 MPa, which was attributed to the inhibition of silicide and  $\alpha_2$  phase for boundary migration and dislocation slipping. Furthermore, the mutual precipitation of coarsening silicide and  $\alpha_2$  phase inside  $\alpha$  matrix was a significant reason for the dramatic decrease in the thermal ability, which also worsened the inhibition for dislocation climbing of silicon element during the creep deformation.

### Keywords

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