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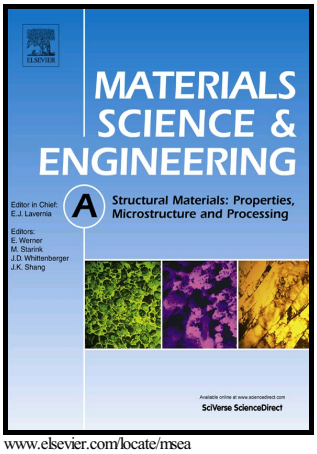

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Abstract: Two TiAl alloys with different Mo contents (Ti-44Al-4Nb-1.0Mo-0.1B-0.01Y, and Ti-44Al-4Nb-1.5Mo-0.1B-0.01Y, referred to LM and HM alloys, respectively) are prepared, and their hot deformation behaviors are characterized via hot compression tests. The results show that the addition of Mo not only refines the grain size of the TiAl alloy but also improves the amount of β phase in TiAl alloy. The hot processing map developed at a true strain of 0.6 shows that the workability of the alloys decreases with increasing the strain rate and decreasing the temperature. The LM and HM alloys have a similar distribution of instability region in processing map, but they do have different instability parameter values, the difference of which is attributed to the cracking in the LM alloy, as well as the "lubrication effect" of β phase in HM alloy. During hot deformation process, the deformation mechanism in LM alloy relies on the dislocation slip of γ and α phase, while in HM alloy there is dislocation slip of β and γ phase, as well as twinning in the γ phase.

Keywords: TiAl-Mo alloy, hot processing map, microstructure evolution, deformation mechanism, crack.

1. Introduction

In recent years, TiAl-based alloys have attracted considerable attentions due to their high strength, high specific stiffness, low density and excellent oxidation resistance [1-3]. TiAl alloys are highly promising for high-temperature structural applications in the aerospace and automobile industries [4-7]. It is reported that geared turbofan PW1100G engine with low-pressure-turbine blades made from wrought TiAl alloy successfully passed the test flight [8]. However, the poor plastic deformability, such as low ductility and fracture toughness, still restrains the large-scale engineering application. The low ductility can be ascribed to the major constituents of the TiAl alloys. Although there are a tetragonal face-centered γ (TiAl) phase ($L1_0$, P4/mmm) and a

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