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金属间化合物TiAl(W,Si)合金的蠕变行为和机制

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CREEP BEHAVIOR AND MECHANISMS OF INTERMETALLIC TiAl(W,Si) ALLOY

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摘要 研究了 Ti-47Al-2 W-0 .5 Si合金在 65 0～ 75 0℃区间的蠕变行为和变形机制。结果表明,合金 65 0℃蠕变寿命与施加应力之间符合线性的双对数关系,可用表达式 $lg^{t}f=1\ 0\ lg^{R}+3\ 0$来描述。蠕变寿命与最小蠕变速率之间满足 Monkman-Grant关系的修正式。合金的比蠕变强度与抗热腐蚀镍基高温合金 K43 8G相当。在70 0℃变载荷下蠕变时具有与恒载荷下蠕变相类似的特征。 80 0℃长期时效粗化合金组织,降低蠕变寿命。位错滑移和形变孪生是合金蠕变的主要变形机制

关键词： 金属间化合物 高温结构材料 TiAl 力学性能 蠕变

Abstract： Creep behavior and mechanisms of Ti-47Al-2W-0.5Si cast alloy have been investigated. The results show that the creep rupture time at 650 ℃ decreases rapidly with the increasing of applied stress, and can be expressed by the formula lg t f =10lg σ +30. The creep rupture time and minimum creep rate fit a linear double-logarithmic relationship, and can be described with the revision of Monkman-Grant relationship. Its creep strength is comparable to the density-corrected strength of nickel-based corrosion-resistant superalloy K438G. Step-like various load creep has similar deformation characteristics compared with constant-load creep. Long period aging at 800 ℃ coarsens the lamellar structure, and subsequently lowers the creep rupture life. Dislocation gliding and deformation twinning are attributed to the dominant creep mechanisms.

Keywords： intermetallics high-t emper atur e st ructural mater ials T iAl mecha nica l proper ties creep

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