

High-temperature strength Mo-Si-B alloy

High temperature strength improvement by adding TiC and ZrC in Mo-Si-B alloy

Summary

Non-cooling high temperature material is needed to run heat engine such as jet engine or gas turbine with high efficiency. Mo-Si-B alloy having high melting point and high temperature strength was focus from before but its property improvement is required. Moreover, Mo-Si-B alloy has high density and poor fracture toughness level at room temperature.

This invention can provide improved high temperature strength Mo-Si-B alloy including its manufacturing process, and also the tool of friction stir welding applicable for Ni-base superalloy and Ti alloy. By adding TiC and ZrC to Mo-Si-B alloy simultaneously, the strength of Mo-Si-B is increased significantly. Moreover, this invention's Mo-Si-B keeps high temperature strength level with lower density and higher fracture toughness level at room temperature compared to the conventional Mo-Si-B alloy.

Effect

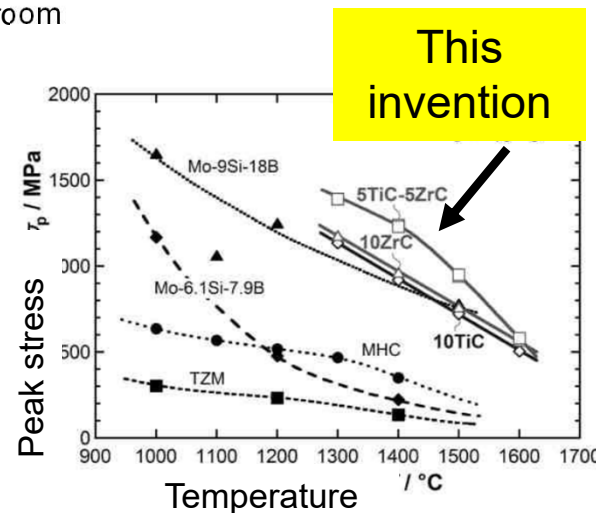
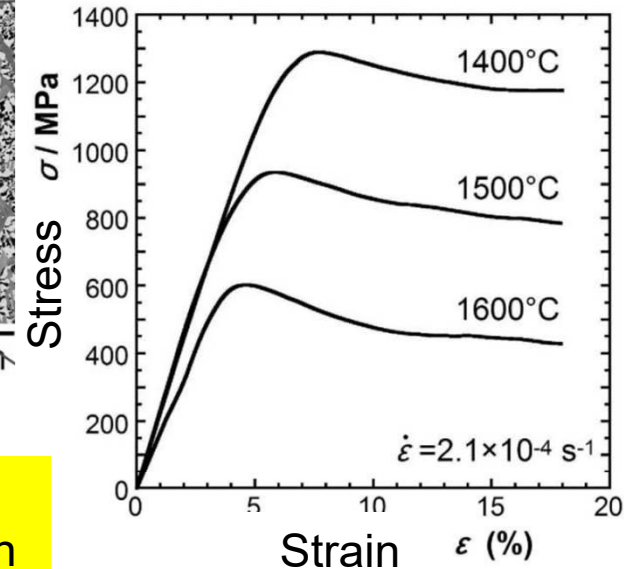
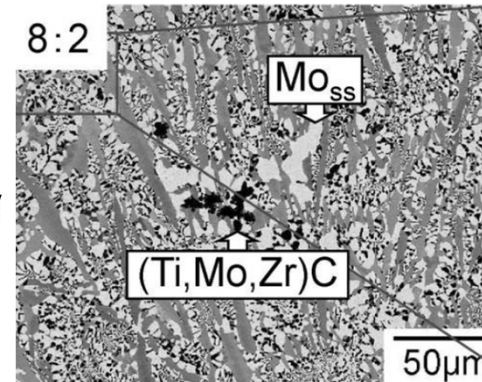
Increased high temperature strength Mo-Si-B alloy
Lower density and higher fracture toughness level at room temperature

Application

- Tool for friction stir welding (FSW)
- Hot extrusion die
- Gas turbine, high pressure turbine wings for power generation
- Jet engine

Patent Data Sheet

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【Up left】 SEM picture of this invention Mo-Si-B alloy ingot with TiC:ZrC=8:2 after casting

【Up right】 High temperature compression test of this invention Mo-Si-B alloy, 65Mo-5Si-10B-5TiC-5ZrC large ingot after casting

【Down left】 Temperature dependency of peak stress after homogenization heat treatment on high temperature compression test of this invention Mo-Si-B alloy

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