

EFFECT OF Al-10Sr ON MICROSTRUCTURE AND FRACTURE TOUGHNESS AT ROOM TEMPERATURE OF Nb-Si-Ti ALLOYS

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With the development of the aero-engine performance to a higher thrust- weight ratio, Nb-Si system ultra-high temperature alloy has been considered as a very promising material to replace Ni base superalloys in the service temperature range over 1350°C. In this paper, the effect of Al-Sr addition on the microstructure and fracture toughness of Nb-Si-Ti alloys was studied. Microstructure of the alloys was observed by scanning electron microscope, and their phase compositions were analyzed with X-ray diffraction and Electro-Probe micro-analyzer. And the room temperature fracture toughness was measured. The results indicated that the phases of Nbss and Nb₃Si were presented in Nb-Si-Ti alloys. However, with the Al-10Sr addition, the alloys were composed of Nbss and β-Nb₅Si₃ phases. Compared with the Nb-Si-Ti alloys, the value of room temperature fracture toughness increased dramatically with the addition of Al-10Sr alloy. The relationship between the microstructure and the fracture toughness was discussed.