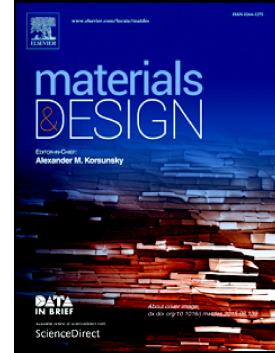


Accepted Manuscript

Role of graphite on microstructural evolution and mechanical properties of ternary TiAl alloy prepared by arc melting method

Hongze Fang, Ruirun Chen, Yong Yang, Yanqing Su, Hongsheng Ding, Jingjie Guo, Hengzhi Fu



PII: S0264-1275(18)30515-X
DOI: doi:[10.1016/j.matdes.2018.06.048](https://doi.org/10.1016/j.matdes.2018.06.048)
Reference: JMADE 4018
To appear in: *Materials & Design*
Received date: 7 April 2018
Revised date: 25 June 2018
Accepted date: 26 June 2018

Please cite this article as: Hongze Fang, Ruirun Chen, Yong Yang, Yanqing Su, Hongsheng Ding, Jingjie Guo, Hengzhi Fu , Role of graphite on microstructural evolution and mechanical properties of ternary TiAl alloy prepared by arc melting method. *Jmade* (2018), doi:[10.1016/j.matdes.2018.06.048](https://doi.org/10.1016/j.matdes.2018.06.048)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Role of graphite on microstructural evolution and mechanical properties of ternary TiAl alloy prepared by arc melting method

Hongze Fang¹, Ruirun Chen^{1,2*}, Yong Yang¹, Yanqing Su¹, Hongsheng Ding¹, Jingjie Guo¹, Hengzhi Fu¹

1, National Key Laboratory for Precision Hot Processing of Metals, Harbin Institute of Technology, 150001, China

2, State Key Laboratory of Advanced Welding and Joining, Harbin Institute of Technology, 150001, China

Corresponding author: Ruirun Chen, Tel: +86 15663808388, E-mail: ruirunchen@hit.edu.cn.

Abstract: Ternary Ti-30.7wt.%Al- x C alloys were prepared with different carbon content ($x = 0.2, 0.4, 0.8, 1.2, 1.6, \text{ and } 2.0$ wt. %) by vacuum arc melting in order to improve the strength and ductility. Microstructure evolution and mechanical properties of alloys were experimentally and statistically studied, especially the carbide formation mechanism. The results show that Ti_2AlC phase appears when carbon content is more than 0.4%, and its volume fraction increases with increasing carbon content. Lamellar colony size, lamellar space and length-diameter of Ti_2AlC phase decrease with increasing carbon. Carbon has the certain solid solubility in matrix. Carbides form when addition of carbon content is over the solid solubility limit. Ti_2AlC acts as heterogeneous nucleation particles and carbon decreases the rate of lateral thickening of γ lamellae plates, which are the reasons for refining microstructure. High-melting-point TiC particles act as nucleation particles to form Ti_2AlC and refine the Ti_2AlC with more TiC content. Tensile strength increases 1.6 times at 750°C with increasing carbon content. Tensile strength increases 1.5 times from 750°C to 850°C with 0.8% carbon and the maximum strain is 3.7%. Precipitation strengthening of Ti_2AlC particles and grain boundary strengthening are mainly mechanisms to improve mechanical properties.

Key Words: TiAl; Carbon; TiC particles; Ti_2AlC particles; Tensile properties

Nomenclature:

γ phase	TiAl phase
α_2 phase	Ti_3Al phase
δ phase	TiAl_3 phase
H phase	Ti_2AlC phase

Download English Version:

<https://daneshyari.com/en/article/7216823>

Download Persian Version:

<https://daneshyari.com/article/7216823>

[Daneshyari.com](https://daneshyari.com)