Accepted Manuscript

Effect of Cr content on the microstructural stability and impact-toughness evolution of a Ni-Fe-based weld metal

Dong Wu, Dianzhong Li, Shanping Lu

PII: S0925-8388(18)31191-5

DOI: 10.1016/j.jallcom.2018.03.314

Reference: JALCOM 45544

To appear in: Journal of Alloys and Compounds

Received Date: 24 September 2017

Revised Date: 22 March 2018

Accepted Date: 25 March 2018

Please cite this article as: D. Wu, D. Li, S. Lu, Effect of Cr content on the microstructural stability and impact-toughness evolution of a Ni-Fe-based weld metal, *Journal of Alloys and Compounds* (2018), doi: 10.1016/j.jallcom.2018.03.314.

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.



Effect of Cr content on the microstructural stability and impact-toughness evolution of a Ni-Fe-based weld metal

Dong Wu^{a, b}, Dianzhong Li^c, Shanping Lu^{a, c, 1}

^a CAS Key Laboratory of Nuclear Materials and Safety Assessment, Institute of Metal Research, Chinese Academy of Sciences;

^b University of Chinese Academy of Sciences, Beijing, 100049, China;

^c Shenyang National Laboratory for Materials Science, Institute of Metal Research, Chinese Academy of Sciences, Shenyang 110016, China.

Abstract

Microstructural stability and impact-toughness evolution of a Ni-Fe-based weld metal with different Cr contents was investigated during long-term thermal exposures up to 10000 h at 700 \Box . With an increase in the Cr content from 21.1 to 23.5 at.%, plate-like sigma (σ) and α -Cr phases formed during the thermal exposure. These phases were mainly located in the interdendritic areas and grew significantly as the thermal exposure time increased. The coarsening process of the γ' phase obeyed the Lifshitz, Slyozov, and Wagner (LSW) model, and the γ' particles maintained a coherent relationship with the γ matrix during the thermal exposure. Carbides (M₂₃C₆) formed and coarsened at the grain boundaries, and their distribution gradually transformed from discontinuous to continuous during the thermal exposure. The evolutions of the γ' phase and M₂₃C₆ carbides were not significantly affected by the Cr-content variation. As the thermal exposure time increased, the room-temperature impact toughness degraded significantly, and a ductile (intragranular)/brittle (mixed intergranular and intragranular) transition occurred. The degradation of impact toughness mainly occurred due to coarsening of the M23C6 carbides along the grain boundaries and the growth of plate-like phases (σ , α -Cr) in the interdendritic areas.

¹Corresponding author. Tel.: +86 24 23971429; fax: +86 24 83970095. E-mail address: shplu@imr.ac.cn (S. Lu).

Download English Version:

https://daneshyari.com/en/article/7992055

Download Persian Version:

https://daneshyari.com/article/7992055

Daneshyari.com