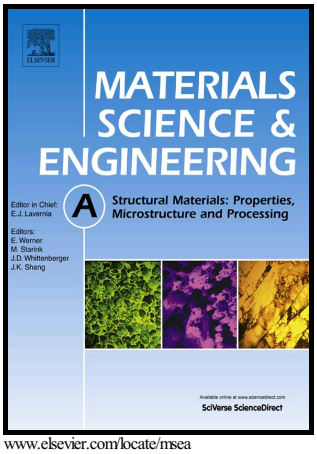
Author's Accepted Manuscript

Experimental and numerical investigation of microstructure and mechanical behavior of titanium/steel interfaces prepared by explosive welding

Qiaoling Chu, Min Zhang, Jihong Li, Cheng Yan



www.elsevier.com/locate/msea

PII: S0921-5093(17)30231-9
DOI: http://dx.doi.org/10.1016/j.msea.2017.02.075
Reference: MSA34751

To appear in: *Materials Science & Engineering A*

Received date: 21 December 2016
Revised date: 17 February 2017
Accepted date: 18 February 2017

Cite this article as: Qiaoling Chu, Min Zhang, Jihong Li and Cheng Yan Experimental and numerical investigation of microstructure and mechanica behavior of titanium/steel interfaces prepared by explosive welding, *Material Science & Engineering A,* http://dx.doi.org/10.1016/j.msea.2017.02.075

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

ACCEPTED MANUSCRIPT

Experimental and numerical investigation of microstructure and mechanical behavior of titanium/steel interfaces prepared by explosive welding

Qiaoling Chu[a], Min Zhang[a]*, Jihong Li[a], Cheng Yan[b]*

[a] College of Materials Science and Engineering, Xi'an University of Technology, Xi'an, 710048, China.

[b] School of Chemistry, Physics and Mechanical Engineering, Science and Engineering Faculty, Queensland University of Technology(QUT), Brisbane, QLD 4001, Australia.

*Corresponding author: +86 02982312205 Email: chu-0080@163.com (Prof. Min Zhang);

+61 731386630 Email: c2.yan@qut.edu.au (Prof. Cheng Yan).

ABSTRACT

This paper presents a systematic study of structure and mechanical behavior of Ti/Fe explosive-bonded interfaces. The transient fluid-like behavior at the bonding zone is simulated using Smoothed Particle Hydrodynamic (SPH) numerical method. The interface is featured by a wave structure, resulted from heavy plastic deformation during the explosive welding. Melted zone resulted from the trapped jetting is surrounded by strongly deformed bulk materials. Fe_2Ti intermetallic compounds with a mixture of FeTi+Fe phases are observed in the melted zone. A reaction layer (~700nm) consisted of nano-sized FeTi grains is formed at Ti/Fe material boundary. Nanoindentation tests and fracture observation confirm the brittle nature of Fe-Ti intermetallics formed in the explosive-bonded joint. Extremely temperature accumulated near the interface leads to recovery and recrystallization in deformed grains, which can accommodate relatively large strain near the interface.

Keywords: Explosive welding; Intermetallics; Nanoindentation; Smoothed Particle hydrodynamic.

1. Introduction

Explosive welding technique has been increasingly employed to produce structural composite materials, which are difficult to be produced via conventional methods, due to potential technical problems such as metallurgical incompatibility

Accepted manuscript

Download English Version:

https://daneshyari.com/en/article/5456516

Download Persian Version:

https://daneshyari.com/article/5456516

Daneshyari.com