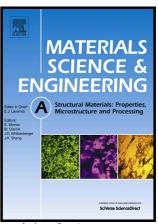
## Author's Accepted Manuscript

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www.elsevier.com/locate/msea

PII: S0921-5093(18)31401-1

https://doi.org/10.1016/j.msea.2018.10.032 DOI:

MSA37027 Reference:

To appear in: Materials Science & Engineering A

Received date: 11 May 2018 7 October 2018 Revised date: Accepted date: 8 October 2018

Cite this article as: Huiping Wu, Heli Peng, Xifeng Li and Jun Chen, Effect of hydrogen addition on diffusion bonding behavior of Ti-55 alloy, Materials Science & Engineering A, https://doi.org/10.1016/j.msea.2018.10.032

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ACCEPTED MANUSCRIPT

Effect of hydrogen addition on diffusion bonding behavior of Ti-55

alloy

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**Abstract** 

The mechanism of hydrogen-induced void closure during diffusion bonding (DB) process of

hydrogenated Ti-55 alloy with different hydrogen contents at different temperatures has been

investigated. When bonded at 700 °C, bonding ratio and shear strength prominently improve with

the increase of hydrogen content, which results from residual hydrogen in bonded sample.

Hydrogen can increase the fractions of high angle grain boundaries (HAGBs) and β phase as well

as break up original long-strip α grains. However, hydrogen almost escapes from hydrogenated

alloy when bonded at 800 °C. Then bonding ratio and shear strength slightly increase with

increasing hydrogen content. It attributes to grain refinement and volume fraction increase of  $\beta$ 

phase. Therefore, residual hydrogen plays a key role in improving diffusion bonding properties

during DB process.

Keywords: Ti-55 alloy; diffusion bonding; hydrogenation; grain boundary diffusion

1. Introduction

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