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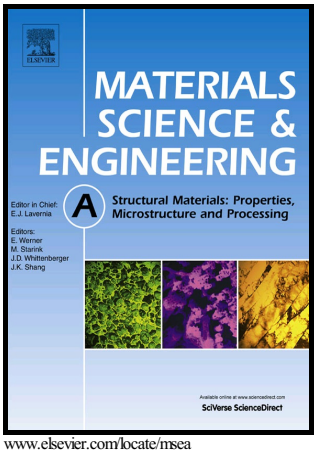

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Effect of hydrogen addition on diffusion bonding behavior of Ti-55 alloy

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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 ℃, 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 ℃. Then bonding ratio and shear strength slightly increase with increasing hydrogen content. It attributes to grain refinement and volume fraction increase of β 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