

Author's Accepted Manuscript

Annealing effect on microstructure and mechanical properties of Al/Ti/Al laminate sheets

Hailiang Yu, Cheng Lu, A. Kiet Tieu, Huijun Li, Ajit Godbole, Charlie Kong



PII: S0921-5093(16)30202-7
DOI: <http://dx.doi.org/10.1016/j.msea.2016.02.087>
Reference: MSA33392

To appear in: *Materials Science & Engineering A*

Received date: 22 September 2015
Revised date: 26 February 2016
Accepted date: 27 February 2016

Cite this article as: Hailiang Yu, Cheng Lu, A. Kiet Tieu, Huijun Li, Ajit Godbole and Charlie Kong, Annealing effect on microstructure and mechanical properties of Al/Ti/Al laminate sheets, *Materials Science & Engineering A* <http://dx.doi.org/10.1016/j.msea.2016.02.087>

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 galley proof before it is published in its final citable 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

Annealing effect on microstructure and mechanical properties of Al/Ti/Al laminate sheets

Hailiang YU^{1*}, Cheng LU¹, A. Kiet TIEU¹, Huijun LI¹, Ajit GODBOLE¹, Charlie KONG²

¹School of Mechanical, Materials & Mechatronics Engineering, University of Wollongong, NSW 2500, Australia.

²Electron Microscope Unit, University of New South Wales, Sydney, NSW 2052, Australia

*Corresponding author: YU HL, yuhailiang1980@tom.com, hailiang@uow.edu.au

Abstract

Trimodal composites, consisting of ultrafine grains, coarse grains, and particles, are known to possess desirable combinations of physical and mechanical properties. In this paper, we report the fabrication of a sheet of trimodal material using roll bonding and annealing of an Al/Ti/Al laminate at 873 K for durations ranging from 6h to 168 h. The Al/Ti/Al laminate was roll bonded from 625 μm (Al sheet thickness 300 μm , Ti foil thickness 25 μm) to 130 μm . The Ti layer was seen to break up and disperse in the aluminium matrix after rolling. It was found that when the annealing time was less than 12 h, there were residual voids at the interface between the TiAl_3 and Al layers, resulting in reduced ductility and strength of the composite sheet. When the annealing time was increased to 24 h, there were no residual voids and the laminate became a kind of trimodal material, consisting of a combination of coarse-grained Al, ultrafine-grained Ti and TiAl_3 particles. This kind of laminate shows the highest yield strength and good ductility. With a further increase in the annealing time to 168 h, no residual pure Ti was seen in the laminate and the TiAl_3 particles were found to be distributed in the Al matrix close to the laminate surface, leading to lower strength and ductility. We also discuss the microstructure evolution and the deformation mechanism during tensile testing.

Download English Version:

<https://daneshyari.com/en/article/1573269>

Download Persian Version:

<https://daneshyari.com/article/1573269>

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