

Accepted Manuscript

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PII: S0167-577X(18)31199-6
DOI: <https://doi.org/10.1016/j.matlet.2018.08.009>
Reference: MLBLUE 24720

To appear in: *Materials Letters*

Received Date: 22 December 2017
Revised Date: 2 August 2018
Accepted Date: 4 August 2018

Please cite this article as: P.L. Niu, W.Y. Li, D.L. Chen, Strain hardening behavior and mechanisms of friction stir welded dissimilar joints of aluminum alloys, *Materials Letters* (2018), doi: <https://doi.org/10.1016/j.matlet.2018.08.009>

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Strain hardening behavior and mechanisms of friction stir welded dissimilar joints of aluminum alloys

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Abstract: Al-Cu alloy was friction stir welded (FSWed) with Al-Zn and Al-Mg alloys, respectively. Tensile properties, strain hardening behavior and fracture mechanisms of the FSWed dissimilar joints were evaluated. Results reveal that the strain-hardening rate of Al-Cu/Al-Zn dissimilar joint is higher than that of base metals due to the presence of finer recrystallized grains in the stir zone, while the strain-hardening rate of Al-Cu/Al-Mg dissimilar joint lies in-between those of base metals. The hardening level of Al-Cu/Al-Zn joint after tensile deformation, defined as HV_f/HV_w (a ratio of microhardness of fractured joints to that of as-welded joints), exhibits an 'M' shape across the welded joint.

Keywords: Friction stir welding; dissimilar joint; aluminum alloys; strain hardening.

1. Introduction

AA2024 (Al-Cu) and AA7075 (Al-Zn) aluminum alloys are extensively used for the aerospace applications due to their enhanced strength and ductility [1,2]. AA5083

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