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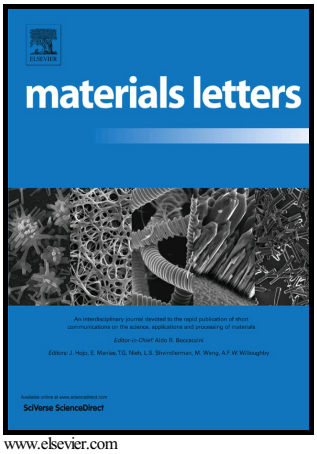

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Weldability and mechanical properties of ultrasonic joining of aluminum to copper alloy with an interlayer

Z. L. Ni, F. X. Ye*

School of Materials Science & Engineering, Tianjin University, Tianjin 300072, China

*Corresponding Author. 501295933@qq.com

Abstract

Al/Cu joints with Al2219 alloy particle as an interlayer were successfully achieved using ultrasonic spot welding (USW) with different welding time and amplitude. Effects of welding parameters on the lap shear tensile strength of the joints were investigated. Based on the results, a sound Al/Cu joint was obtained, without gaps in the interface of Cu/interlayer. Compared with the conventional welding, plastic deformation in the copper side was greater and the lap shear tensile strength was higher. Welding parameters were optimized, and the lap shear tensile strength was highest when the welding time was 0.45s and the amplitude was 45μm.

Keywords: Microstructure; Copper; Aluminum; Welding; Mechanical properties; Weldability

1. Introduction

Mass reduction for automotive application is regarded to be a promising attempt to enhance fuel efficiency and reduce fuel consumption, climate changes and anthropogenic environmental damages [1-5]. As a consequence, developments concentrated on lightweight structure especially about vehicle body are carried out by utilizing aluminum. Electrical resistance spot welding is difficult and expensive to apply to join aluminum alloy, which is attributed to the characteristics of low strength,