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Microstructure Evolution and Mechanical Properties of Friction Stir Welded Dissimilar Joints of AA5083 and AA1050 Aluminum Alloys

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Abstract: In the present work, the friction stir processing was applied to join the dissimilar structural alloys of AA5083 and AA1050. The microstructure evolution during friction stir welding of alloys were investigated by means of the optical microscope (OM), field emission scanning electron microscopy (FESEM) equipped with energy dispersive spectroscopy (EDS). The mechanical properties of the dissimilar FSW joint were evaluated using hardness and tensile tests. Experimental results showed that the nugget zone (NZ) exhibited equiaxed recrystallized grains of the two materials with flowing shape and mainly composed of the advancing side (AS) material. The ultimate tensile and yield strengths of the dissimilar FSW joint was higher than the AA1050 base metal while lower than the AA5083, having fractured on the AA1050 side.

Keywords: Aluminum alloys; Dissimilar friction stir welding; Microstructure; Mechanical properties.