عنوان مقاله:

Effects of Zr on grain refinement, microstructure and tensile properties of an Al–20Mg Alloy

محل انتشار:

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خلاصه مقاله:

In the present study, microstructure and tensile properties of an Al–20Mg alloy with Al-20Mg-xZr alloys were investigated and compared. As-cast microstructure analysis of Al-20Mg alloy contains the dendrites of primary α-phase solid solution within the eutectic matrix which consists of β-Al3Mg2 intermetallic and α solid solution phase. In order to produce Al-20Mg-xZr alloy, Zr added to the molten Al-20Mg alloy in form of Al-15Zr master alloy during the melting process. Scanning electron microscopy (SEM) and Energy Dispersive X-ray (EDX) analysis were utilized to study the microstructure and fracture surfaces of samples. The result indicates that adding Zr made significant raise in the Ultimate Tensile Strength (UTS) and elongation values of the alloy. These properties in Al-20Mg alloys prepared without using additives are 163 MPa (average) and 1.2%, respectively. However, an Al-20Mg-0.5Zr alloy showed the greatest values of 240 MPa and 1.75%, respectively. The main reason for the observed increase would be the reduction of Al (α) grain size and also the fragmentation of Al (α) interconnected coarse dendrites.

کلمات کلیدی:

Aluminium alloys, Grain refinement, Microstructure, Tensile properties, Zr