

عنوان مقاله:

Effect of Precipitation Hardening on Microhardness and Compressive Strength of Air-Casted Dilute Mg-0.4Al-0.6Ca Alloy

محل انتشار:

هفتمین کنفرانس بین المللی مهندسی مواد و متالورژی و دوازدهمین همایش ملی مشترک انجمن مهندسی متالورژی و مواد ایران و انجمن ریخته گری ایران (سال: 1397)

تعداد صفحات اصل مقاله: 10

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خلاصه مقاله:

Development of low-cost, rare-earth-free and high-strength magnesium alloys is highly desirable. Reduced quantity of secondary phases in dilute alloys could enhance their ductility. Dilute Mg-0.4Al-0.6Ca (wt.%) alloy with Ca/Al ratio of 1.5 was successfully air casted thanks to minor Calcium addition. The alloy showed high age hardening response, with an increment of about 36 HV in the peak-aged state. The ultimate compressive strength of as-cast and peak-aged alloys are 243 MPa and 293 MPa, respectively. Microstructural study of alloys by scanning electron microscope and energy-dispersive X-ray spectroscopy shows the formation of Mg₁₇Al₁₂ phase has been suppressed due to high Ca/Al ratio and Mg₂Ca is the only present second phase. Microstructural comparison of as-cast, solution-treated and peak-aged alloys do not show any significant difference. This verifies previous studies that attributed the high hardness of peak-aged dilute alloys to the presence of fine plate-like Guinier-Preston (GP) zones on the basal plane.

کلمات کلیدی:

Magnesium alloys, Precipitation hardening, Guinier-Preston zones, Peak-aged, Ca/Al ratio

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