Microstructures and mechanical properties of an Mg-Li-Al-Zn alloy with minor Sc addition

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Abstract

An Mg-Li based alloy containing Sc addition has been prepared by melting and solidification in a carbon steel crucible, and extruded at a billet preheating temperature of 200°C with an extrusion ratio of 28. Age heat treatments and thermomechanical processing were performed to investigate the effect of minor addition of Sc on the microstructures and mechanical properties. Hardness, optical microscopy, X-ray diffraction studies, and tensile tests were carried out to explore the variations in microstructures and mechanical behaviors during processing. The Mg-Li based alloy with Sc addition presented age hardenable effect at room temperature. The hardness decreased rapidly with aging temperature at temperatures below 50°C. Thermomechanical treatment could enhance the work hardening effect to improve the mechanical properties.

Keyword：Metals; Precipitation; X-ray diffraction; Scanning electron microscopy, SEM