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# **Fabrication of high-strength Mg-Y-Sm-Zn-Zr alloy by conventional hot extrusion and aging**

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## **Abstract**

A high-strength Mg-7Y-5Sm-0.5Zn-0.3Zr alloy was developed successfully by hot extrusion and subsequent aging treatment. The results showed that the as-solutionized alloy mainly contained  $\alpha$ -Mg matrix and 14H LPSO phase distributed at grain boundaries. Lamellar LPSO and  $\gamma'$  phases were dynamically precipitated during hot extrusion and retained after artificial aging treatment at 200°C. After peak-aged treatment, the alloy exhibited excellent mechanical properties with ultimate tensile strength of 465 MPa, 0.2% proof stress of 413 MPa and elongation to failure of 6.5% at room temperature. The high yield strength was attributed to the combined action of 14H-LPSO phase, basal  $\gamma'$  precipitates and dense distribution of  $\beta'$  precipitates at prismatic plane.

**Keywords:** Mg-RE alloy; Extrusion; Microstructure; Precipitation; High strength.

## **1. Introduction**

High-strength magnesium alloys have a great potential for improving fuel efficiency in aerospace and automotive industries [1]. One drawback is that current commercial Mg alloys have inadequate mechanical properties as compared with its counterpart aluminum alloys. It has been recognized that Mg rare-earths (REs) alloys containing medium and/or heavy REs show better mechanical performances at both room temperature and elevated temperature, which results from remarkable solute and precipitate strengthening [2,3]. To date, high-strength Mg-RE alloys are mainly based

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