**Fabrication of High specific strength Mg alloy by severe plastic deformation**

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**ABSTRACT**

The need to achieve weight savings in automobile industry due to global concern on environment preservation shifted the prime focus on materials with high specific strength. The recent developments in magnesium and its alloys were promising owing to their low density, high specific strength, ease of machinability and recyclability. This work aims at evaluating the development of magnesium alloys with high specific strength imbibed with Long period stacking ordered (LPSO) phases and secondary phases like Mg5Gd, Mg2Ni dispersed in the parent metal. The idea of high lithium content was instrumental in reducing the density and improved ductility owing to the formation of dual phase magnesium. The alloy Mg74Zn0.5Ni0.5Gd2Li23 (at. %) melted using high purity Mg, Zn, Ni, Gd and Li in an induction melting furnace under argon atmosphere. Mild steel crucible was used for melting and poured into a cylindrical mold to obtain an ingot of 20 mm diameter. Ingots were sealed in a glass tube under argon atmosphere for solutionising at 510 ℃ for 48 hours and are subsequently hot extruded at 350 ℃ soaking for 4 hours at 16:1 extrusion ratio. X-ray diffraction was performed at different stages like as-cast, solutionised and as-extruded to reaffirm homogeneity, dissolution of phases and evolution of phases respectively. SEM images portrayed a clear reduction in the grain size due to dynamic recrystallization happened as a consequence of extrusion. The microstructure constituted the refined grains and uniformly dispersed secondary phase throughout the grains. The yield stress and ultimate stress evaluated through the room temperature compression and tension testing performed at a rate of 10-3 sec-1. The high strength of the material can be attributed to the fine grains and dispersion strengthening by the secondary phases as well as LPSO phases.

*Keywords: Mg-Li alloy; LPSO; High specific strength; Extrusion*