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Effect of Pr on microstructure and workability evolution of AM50 alloy in extrusion processes

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Abstract
Mg alloys have many applications in different industries due to their high strength to weight ratio such as Aerospace, automotive and even bio materials. Microstructural stability is a crucial but controversial issue for Mg-Al-RE alloys. It is important to study the thermal stability of Al-RE intermetallic phase with individual RE element. This work carried out to investigate the effect of extrusion process on the microstructure of Mg-Al-Mn (AM50) alloys by adding 0.5 and 1wt.% Pr to this alloys. The presence of stable Al-Pr phases was also demonstrate in this study .The samples were examined by using optical microscopy (OM) to evaluate the modification efficiency of the extrusion and the result show that grain size of alloys decrease with Pr element. Measuring grain size in extruded and casting mode show that reduction in grain size from 76μm to 10μm from as-cast to extrude condition.

Keywords*:* Workability, Mg alloys, AM50, Extruded, Microstructure

Introduction
Among Mg alloys, Mg-Al based alloy is the most widely used, due to a good combination of high strength at room temperature, good cast-ability and excellent corrosion resistance, but they still have problems in comparison to aluminum alloys [1-10]. Since Mg alloys have hexagonal closed packed (HCP) crystal structure with a limited number of slip systems, the ductility of polycrystalline magnesium alloys are normally poor at room temperature The activation of additional slip systems at elevated temperatures normally increases the workability of Mg and its alloys and hence hot deformation processing can be considered as a suitable processing route for plastic forming of Mg alloys [3]. Moreover, owing to its influence upon the structural refinement, hot working is an indispensable tool for enhancing the properties of Mg alloy castings. Therefore, the hot extrusion process is considered to be an indispensable tool for enhancement of the

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