Characterization of Magnesium Alloys from a Novel Containerless Melting and Casting Process

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Magnesium alloys have broad application in electronics and automobiles because of their high strength to weight ratios, good thermal conductivities and relative low costs. However, magnesium is chemically reactive and has a hexagonal close-packed (hcp) structure, which is lack of slide system. Current casting and rolling processes are far from satisfaction.

Magnetic Suspension Melting (MSM) method is a novel casting method that has been developed in recent years. Comparing traditional die casting, there are several advantages of MSM method such as low superheat and containerless melting. The effect of MSM method on Mg alloys is still unknown.

We proposed to characterize the difference of one kind of Mg alloy, AZ31, between conventional die casting process and MSM process. Our research to date has focused on sample preparation and preliminary structural and mechanical tests. Current results show that MSM on AZ31 has larger yield stress and fine grain size comparing with traditional die casting. In future research, several other techniques, such as X-ray Diffraction (XRD) texture analysis and Transmission Electron Microscopy (TEM) analysis, will be employed to investigate the detail structure.