

Monitoring of precipitation process in AZ31 and AZ91 magnesium alloys by internal damping measurement

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Internal damping is able to monitor the microstructural changes in solid materials and these changes can be based on various mechanisms. In this investigation a same heat treatment was carried out on AZ31 and AZ91 magnesium alloys, aimed at detection of microstructure changes of material after homogenization annealing and also the process of precipitation was continuously analyzed by the internal damping measurement. Internal damping was measured as a function of temperature in AZ31 and AZ91 magnesium alloys by ultrasonic resonance spectroscopy. The internal damping spectrum was measured in the temperature range from 50 °C up to 390 °C. Peaks of internal damping occurred in temperature range from 250 °C up to 350 °C on AZ91 magnesium alloy. Also the microstructure analysis was carried out at the different stages of the internal damping measurement which showed creation of continuous precipitate in the maximum of the internal damping peak. The creation of the peak is caused by absorption of energy by the process of continuous precipitate nucleation and growth in the volume of material grains.

Keywords: Internal Damping, Magnesium Alloy, Continuous Precipitate

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