

Abstract

Two sets of experiments were carried out in this work. The first was the reaction between solid Mg and solid Ni, and the second was the investigation of dominant diffusion species in the formation of Mg₂Ni. The data of kinetics for Mg-Ni interfacial reaction would be established.

In this work, the Mg and Ni sheets were combined and then taken to perform solid/solid reaction at 400°C, 430°C, 450°C and 480°C for 10~75 hours, respectively. The morphology of the heat-treated specimens was observed by scanning electron microscope(SEM). The chemical composition was measured by electron probe microanalysis(EPMA). The diffusion couple specimen was taken apart to analysis which kind of intermetallic compound was formed at the interface of Mg/Ni by X-ray diffractometer(XRD). The result showed that just single Mg₂Ni phase was formed at the interface of Mg/Ni and the thickness of Mg₂Ni is linear to the square root of reaction time. Thus, it is believed that the reaction of the formation of Mg₂Ni at the Mg/Ni interface is diffusion controlled.

In addition, it was also investigated that which element in Mg/Ni diffusion couple diffused faster at reaction temperature between 400 and 480°C. The result presented that Mg possesses higher diffusivity than Ni in accordance with SEM

pictures. However, this result is different from that of other researchers made by simulation of Rutherford backscattering spectrometer(RBS) research of Mg/Ni coating membrane at relatively low temperature(225°C). We consider that the dominant diffusion species in the formation of Mg_2Ni could change at different reaction temperature. But this assumption need more experimental result to support.