

NITRIDATION OF AL-MG-SI ALLOYS THROUGH DYNAMIC HEATING

Abstract

Nitridation behaviour of Al-Mg-Si alloys as studied as a function of temperature by means of thermogravimetry method. A reactive gas, $N_2-4\%H_2$ at a rate of 10 ml/min was purged into the thermogravimetry analyser chamber. The Al alloys were heated from 25°C to 625°C at the heating rate of 15°C/min and then reduced to 3°C/min until it reached 1500°C. It was found that by varying the amount of Mg and Si in Al-Mg-Si alloys significantly influenced the growth of the composites. A differential thermogravimetric curve shows the Mg containing alloys experienced many steps of chemical reactions. This indicates that besides AlN presence as a major phase, other compounds also exist in the final product. The X-ray diffraction results confirmed the existence of oxide phases such as $\alpha-Al_2O_3$, $MgAl_2O_4$ and MgO in addition to residual Si and Al metal. The presence of oxide compounds is believed to be due to the reaction between the alloying elements and residual oxygen gas left in the reaction atmosphere. It was also found that Si could play a role in promoting the weight gain of the composite produced. The heating rate has also a profound effect on the weight gain, whereby higher heating rate resulted in low yielded of AlN during the nitridation reaction of the Al-Mg-Si alloys.

Author Keywords

A/N; Dynamic heating; Nitridation; Thermogravimetry