CORROSION BEHAVIOUR OF Al 2009 REINFORCED WITH SILICON CARBIDE WHISKERS

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Abstract

Objective of this research project is to study the corrosion behaviour of aluminium 2009 matrix composite reinforced with silicon carbide whiskers. The composite is produced by powder metallurgy process. For corrosion test, four specimens (240, 320, 400 and 600) according to their surface roughness were tested with sodium chloride (NaCl) by salt spray testing for 82 hours. Corrosion study was identified by specimen weight gain for 20 hours and 82 hours. From the results, it showed that the corrosion was increased on the rough surface compared with the smooth surface. From the result of XRD, it showed that Mg play important role to form corrosion product of spinel ($MgAl_2O_4$).

Keywords: corrosion, composite, XRD

1 Introduction

Aluminium matrix composites (AMC) are currently being developed for engineering components because of high stiffness, elevated temperature properties and good fatigue resistance [1]. However, the limitation of AMC applications is concern about the effect of the reinforcement on corrosion resistance. Previous corrosion studies on AMC have shown various mechanisms such as high dislocation density around the reinforcement, voids at the interface between matrix and reinforcement [1], oxidised layer on the reinforcement [2] and segregation of alloying elements to the interface between matrix and reinforcement [3, 4]. The objective of this paper is to show the corrosion behaviour of composite Al 2009 reinforced with SiC whiskers when tested through the salt spray for 20 and 82 hours.

2 Experimental Procedure

The composite Al 2009/SiC whisker was supplied by Advanced Composite Materials Corporation (ACMC), USA. The composite was fabricated by powder metallurgy technique. For corrosion test, four samples were ground with 240, 320, 400 and 600 grid of SiC papers to obtain different surface roughness. Then the samples were tested with NaCl 5% by salt spray testing for 82 hours. The corrosion rate was determined by sample weight gain after 20 and 82 hours exposure. The corrosion product was determined by XRD Philip.

3 Results and Discussion

Figure 1 shows the qualitative composite sample diffraction pattern indicating the presence of aluminium as the matrix, magnesium as an alloying element whereas SiC is the reinforcement.