

The influence of fly ash on the microstructure and mechanical properties AA6063 alloy using compocasting technique

ABSTRACT

Fly ash (FA) has collected attention as a possible reinforcement material for aluminium matrix composites (AMCs) to improve the properties and decrease the production cost. In this study, AA6063 alloy was reinforced with FA particles by compocasting technique. The experiments were conducted by varying weight percentage of FA (0 to 12 wt.% in steps of 2%). The FA particles were incorporated into semisolid state of AA6063 alloy melt. The microstructure of aluminum-FA particulate composite (AA6063-FA) prepared with the homogenous distribution of FA was analyzed using X-ray Diffraction (XRD), Energy Dispersive X-ray spectroscopy analysis, Variable pressure scanning electron microscope (VPSEM) and Field emission scanning microscope (FESEM). The mechanical and thermal properties of the composites were determined with a tensile, compressive and thermal expansion tests. The experimental results indicated that the microstructure, mechanical and thermal properties of AA6063-FA composites were observably affected by increasing FA content. The fracture surface was observed to be different in the failure mechanism.

Keyword : Fly ash FA; AA6063 alloy; Aluminium matrix composites; Compocasting method; Microstructure; Thermal expansion; Mechanical properties