The effects of superheating treatment on distribution of eutectic silicon particles in A357-continuous stainless steel composite

Abstract

In the present study, superheating treatment has been applied on A357 reinforced with 0.5 wt.% (Composite 1) and 1.0 wt.% (Composite 2) continuous stainless steel composite. In Composite 1, the microstructure displayed poor bonding between matrix and reinforcement interface. Poor bonding associated with large voids also can be seen in Composite 1. The results also showed that coarser eutectic silicon (Si) particles were less intensified around the matrix reinforcement interface. From energy dispersive spectrometry (EDS) elemental mapping, it was clearly shown that the distribution of eutectic Si particles were less concentrated at poor bonding regions associated with large voids. Meanwhile in Composite 2, the microstructure displayed good bonding combined with more concentrated finer eutectic Si particles around the matrix reinforcement interface. From EDS elemental mapping, it was clearly showed more concentrated of eutectic Si particles were distributed at the good bonding area. The superheating treatment prior to casting has influenced the microstructure and tends to produce finer, rounded and preferred oriented α-Al dendritic structures.