Influence of Liquid State Stir Casting Method on Agglomeration of Graphite Reinforced Particles in Aluminum Matrix

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ABSTRACT

Aluminum metal matrix composites are one of the significant revolutions in the development of advanced materials. Graphite, in the form of particulates, has been considered as a high-strength, low-density material. Graphite is a popular reinforcement for metal matrix composites which can be used as solid lubricant and makes the composite self-lubricating material. Aluminium alloys dispersed with graphite particles are known as potential materials for tribiological applications such as bearings, bushings, pistons, etc. Aluminum graphite particulate metal matrix composites produced by liquid state casting method represent a class of inexpensive tailor-made materials for a variety of automotive components. Defects such as agglomerates, and segregation of graphite particulates play a main role in rushing the fracture process.

Figure 1: Agglomeration of graphite particles in Al matrix.
The main purpose of this project work was to investigate the influence of liquid state stir casting method on the formation of graphite agglomerates in the aluminum matrix.

The agglomeration of graphite had significantly weakened the composite. After tensile testing, the agglomerated graphite particles were fractured and delaminated. Microstructural characterization was done using a SEM (JEOL JEM-9320FIB). The aluminum matrix phase morphology and the distribution of graphite particulates depend on the relative magnitudes of dendrite arm spacing and inter-particulate spacing. The segregation of particles into the interdendritic regions causes severe agglomeration and interparticle contact, impairing the mechanical properties.

REFERENCES