

Mechanical and Tribological Behavior of Powder Metallurgy Processed Aluminum-Graphite Composite

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ABSTRACT

In this research, the mechanical and tribological behavior of aluminum–graphite (Al–Gr) composite has been investigated in order to determine the optimum composition of reinforcement. The materials were fabricated by a powder metallurgy process and three different weight percentages of Gr were chosen as a reinforcement in pure Al at 3, 5 and 7 wt % to identify its potential for self-lubricating property under dry sliding conditions. The mechanical properties examined included hardness, tensile strength and flexural strength. The wear tests were conducted by using a pin-on-disc tribometer to evaluate the tribological behavior of the composite and to determine the optimum content of graphite for its minimum wear rate. The results show that the mechanical properties decreased with the addition of Gr. However, 3 wt % Gr reinforced composite offers better mechanical properties as compared to that of other compositions. The wear rate and coefficient of friction also decreased with the addition of Gr and reaches its minimum value at 3 wt % Gr. A smooth graphite layer was observed in the worn surface of the 3 wt % Gr reinforced composite demonstrates superiority in terms of wear properties as compared to base material and other composites compositions.

KEYWORDS

Metal-matrix composites (MMCs); mechanical properties; wear; powder metallurgy

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