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**Mechanical and Wear Characterization of Ceramic Boron Carbide-Reinforced Al2024 Alloy Metal Composites**

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**Abstract**

In the present research, the effect of 44- $\mu\text{m}$ -sized B4C addition on the mechanical and wear performance of Al2024 alloy has been studied. The Al2024 alloy metal matrix composites reinforced with varying wt% (2, 4, 6 and 8) of B4C particulates were fabricated by stir cast route. The synthesized composites were subjected to microstructural studies, mechanical and wear properties testing. Microstructural characterizations of obtained samples were carried out by SEM microscopy and XRD patterns. The presence of B4C particles was confirmed by the XRD patterns. The hardness, tensile and compression strengths of metal composites have been enhanced with the addition of B4C reinforcement. There was, however, a decrease in the ductility of the Al2024 alloy composite after the incorporation of the reinforcement. The wear behaviour of the prepared samples was tested at varying loads and speeds. The microcomposites exhibited superior wear resistance. Various fracture and wear mechanisms were observed in the Al2024–B4C composites using SEM.

**Keywords:**

Al2024 alloy, B<sub>4</sub>C particles, Microstructure, Hardness, Tensile strength, Wear, Fractography, Wear debris

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