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Mechanical Study of Aluminium -Silicon Carbide - Tungsten Carbide Hybrid Composite Synthesized Through Powder Metallurgy Technique

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Abstract: *In this study, powder metallurgy is used to create hybrid metal matrix alloys made of aluminium-silicon carbide -tungsten carbide. Aluminium metal matrix composites are now vastly used in automobile industry due to superior qualities, such as improved corrosion protection, high ductility, and strength to weight ratio is also high too. With individual silicon carbide reinforcement, weight percentages of 5%, 10%, 15% and 20% of composite samples are created using the powder metallurgy method. The manufactured composite samples' physical and mechanical characteristics were examined. By using two analysis(SEM and XRD), aluminium, siliconcarbide, and tungsten carbide are found. Aluminium -10%Silicon Carbide -10%Tungsten Carbide reinforcement was determined to have a higher ultimate tensile strength (UTS) of 263 MPa as well as yield strength (YS) of 202 MPa for composite. Aluminium -10%Silicon Carbide -15 %Tungsten Carbideand Aluminium -10%Silicon Carbide -20%Tungsten Carbide reinforcement showed that the intermetallic specimenis formed(eg: Al_2Cu), which causes a drop in the UTS and YS of manufactured samples. Hybrid composites made of Aluminium, silicon carbide10%, and 10% WC had the greatest combination of mechanical properties. Aluminium, silicon carbide, and WC particles can be seen in the XRD images. Aluminium-silicon carbide 10%-15% WC and aluminium-silicon carbide 10%-20% WC were found to have intermetallic phases present as well. SEM as well as EDS mapping were verified, reinforcements for the 15% and 20% WC reinforcements were distributed uniformly and formed into agglomerations. In comparison to monolithic aluminium, the results revealed that the aluminium-silicon carbide 10%- 10% WC has superior mechanical properties.*

Keywords: Mechanical properties, Silicon Carbide, Tungsten carbide, aluminium

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