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# Effect of Heat Treatment on Mechanical Properties and Wear Behavior of Al7075 Alloy Reinforced with Beryl and Graphene Hybrid Metal Matrix Composites

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**Abstract :** In the recent years, aluminum metal matrix composites were most widely used, which are finding wide applications in various field such as automobile, aerospace defense etc., due to their outstanding mechanical properties like low density, light weight, exceptional high levels of strength, stiffness, wear resistance, high temperature resistance, low coefficient of thermal expansion and good formability. In the present work, an effort is made to study the effect of heat treatment on mechanical properties of aluminum 7075 alloy reinforced with constant weight percentage of naturally occurring mineral beryl and varying weight percentage of graphene. The hybrid composites are developed with 0.5 wt. %, 1wt.%, 1.5 wt.% and 2 wt.% of graphene and 6 wt.% of beryl  by stir casting liquid metallurgy route. The cast specimens of unreinforced aluminum alloy and hybrid composite samples were prepared for heat treatment process and subjected to solutionizing treatment (T6) at a temperature of 490±5 <sup>o</sup>C for 8 hours in a muffle furnace followed by quenching in boiling water. The microstructure analysis of as cast and heat treated hybrid composite specimens are examined by scanning electron microscope (SEM). The tensile test and hardness test of unreinforced aluminum alloy and hybrid composites are examined. The wear behavior is examined by pin-on disc apparatus. The results of as cast specimens and heat treated specimens were compared. The heat treated Al7075-Beryl-Graphene hybrid composite had better properties and significantly improved the ultimate tensile strength, hardness and reduced wear loss when compared to aluminum alloy and  as cast hybrid composites.

**Keywords :** beryl, graphene, heat treatment, mechanical properties
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