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# Microstructure and mechanical characterization of Al6061-CNT nanocomposites fabricated by spark plasma sintering

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## Abstract:

In this research the effect of spark plasma sintering at different temperature on the microstructure and mechanical properties of the milled Al6061 alloy and Al6061-CNTs metal matrix composites was studied. Horizontal attritor mill were used as milling technique and scanning electron microscopy (SEM) and transmission electron microscopy (TEM) were used to study the morphology of products. The results indicate that the tensile stress of the Al alloy decrease from 325 to 290 MPa with increasing sintering temperature from 450 to 550°C, due to rapid grain growth of aluminum nanocrystals. On the contrary, the tensile strength of the nanocrystalline aluminum-CNT increased from 375 to 430 MPa with an increase in sintering temperature. TEM images show the existence of aluminum carbide at higher sintering temperature which has positive effect on the metal-CNT bonding. Another reason of improved properties of Al6061/CNT nanocomposite is the homogenous distribution of CNT as reinforcement and its effect on the grain size stability even at higher sintering temperature. Studies on densification behavior revealed that Al6061 with CNT addition densified in ~100°C lower temperature when compared with unreinforced

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