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ANALYZING THE IMPACT OF REINFORCEMENT ADDITION ON THE MECHANICAL PROPERTIES OF ALUMINUM A356 ALLOY

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ABSTRACT

The need to have materials which can respond satisfactorily to dynamic changes encountered in service conditions have driven engineering and scientific researchers into fabrication of a unique class of engineering materials known as functionally graded materials (FGM). Consisting of a combination of metal and ceramic reinforcement, FGM exhibit properties which are not achievable with monolithic materials. In this study, the author studied the impact of the variation in size and weight-percent of silicon carbide (SiC) reinforcement particles on the properties of fabricated Al-SiC FGM composites. Two sets containing three FGM samples were fabricated. The SiC configuration by weight-percent and size were (1 wt.%, 3 wt.%, 5 wt.%) 7 µm and (1 wt.%, 3 wt.%, 5 wt.%) 15 µm. A seventh sample containing 0% SiC was used as a control. The experimental results indicate that the introduction of SiC reinforcement into the matrix impacts on the compressive and shear behavior of aluminum A356 alloy. The sample with the combination of the finest granularity (7 µm) and highest percentage-weight (5 wt.%) displayed the highest compressive strength and Young's modulus values of 3.11 GPa and 6.39 GPa respectively, with a shear strength and shear modulus of 14.4 GPa and 9.29 GPa respectively.

KEYWORDS: Metal Matrix Composites, Compressive Strength, Young's Modulus, Silicon Carbide & Aluminum A356 Alloy

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