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**Synthesis and characterization of nano graphene and Al2O3 reinforced aluminium metal matrix composites**

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**Abstract**

The present work explores the microstructural and mechanical properties of Aluminium (Al) [Metal Matrix Composites](https://www.sciencedirect.com/topics/materials-science/metal-matrix-composite) (MMCs) fortified with Zirconium Oxide (ZrO2) and nanographene particles. The composite material is processed by the mix fluid [metallurgy](https://www.sciencedirect.com/topics/materials-science/metallurgy) course. ZrO2 and graphene is blended in various extents in which ZrO2 (1 wt. %) reinforcement is kept steady and graphene support is varied independently with 0.5 and 0.75 wt. %. Utilizing optical and SEM equipment, micro examination is conveyed and results uncover that uniform circulation of ceramic [zirconium](https://www.sciencedirect.com/topics/materials-science/zirconium) dioxide (ZrO2) and graphene particles are found in the as cast Al6061 [MMCs](https://www.sciencedirect.com/topics/materials-science/metal-matrix-composite). [Fourier-Transform Infrared Spectroscopy](https://www.sciencedirect.com/topics/materials-science/fourier-transform-infrared-spectroscopy) (FTIR) investigation is done to know the quality and measure of fortification present in composites and notes the energy gap (Eg) obtained as 4.05 eV. Mechanical tests according to ASTM standards were led on the composites viz., [tensile strength](https://www.sciencedirect.com/topics/materials-science/tensile-strength), yield strength and % elongation to check the properties of Al based MMCs. The consequence of this work is reasoned with a noteworthy improvement in tensile and yield strength values of the processed composites however, the percentage elongation diminishes with the addition of reinforcement content in the fabricated composite.

**Keywords:**

Al 6061, Metal matrix composite, Stir casting, Tensile, Zirconium dioxide, Graphene etc.

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