

Study of the Microstructure and Mechanical Properties of Locally Developed Carbon Fibers-Silica Sand Nanoparticles Aluminium Based Hybrid Composites

Authors : Tahir Ahmad, M. Kamran, R. Ahmad, M. T. Z. Butt

Abstract : Hybrid aluminum metal matrix composites with 1, 2, 3 and 4 wt. % of silica sand nanoparticles and electro-less nickel coated carbon fibers were successfully developed using sand casting technique. Epoxy coating of carbon fibers was removed and phosphorous-nickel coating was successfully applied via electro-less route. The developed hybrid composites were characterized using micro hardness tester, tensile testing, and optical microscopy. The gradual increase of reinforcing phases yielded improved mechanical properties such as hardness and tensile strength. The increase in hardness was attributed to the presence of silica sand nanoparticles whereas electro-less nickel coated carbon fibers enhanced the tensile properties of developed hybrid composites. The microstructure of the developed hybrid composites revealed the homogeneous distribution of both carbon fibers and silica sand nanoparticles in aluminum based hybrid composites. The formation of dendrite microstructure is the main cause of improving mechanical properties.

Keywords : aluminum based hybrid composites, mechanical properties, microstructure, microstructure and mechanical properties relationship

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