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Effect of particle size on mechanical properties of SiC particle-reinforced aluminium alloy composites

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Abstract

Aluminium-based Metal matrix composites (MMCs) have become increasingly used for structural applications in various industrial sectors because of their excellent specific stiffness and specific strength. Particle reinforced MMCs possess distinct advantages over fiber reinforced counterparts in terms of low cost and isotropic mechanical properties and their ability to be processed using similar technology used for monolithic materials. The present work was focused, Al6061 alloy metal matrix composites reinforced with three different sizes and weight % of SiCp up to 20 wt.% were fabricated by a vortex method. The effects of SiCp content and size of particle on the mechanical properties of the composites such as hardness and tensile strength were investigated. The density measurements showed that the samples contained little porosity, and the amount of porosity in the composites increased with increasing weight % and decreasing size of particles. Scanning electron microscopic observations of the microstructures revealed that the dispersion of the coarser sizes of particles was more uniform. The results show that the hardness and the tensile strength of the composites increased with decreasing size and increasing weight % of particles. The fracture surface of the matrix alloy has large dimples and heavy shear deformation prior to failure. But in the case of the composite, it can be seen that the extent of ductile dimpling has decreased with the inclusion of SiC particles. The dimple size has been reduced significantly and the nature of failure of the interconnecting ligaments is by ductile tearing.

Biography

Dr. M C Krishnamurthy has completed his Ph.D at the age of 45 years from Bangalore University and postgraduate studies from Bangalore University. He is working as Professor in the department of Mechanical Engineering. He has published 4 journals and 14 publications in international and national conferences. He worked as a Local Inspection Committee (LIC) member for Visvesvaraiah Technological University Belgaum.