World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:10, No:8, 2016

Studying the Effect of Different Sizes of Carbon Fiber on Locally Developed Copper Based Composites

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Abstract : Metal Matrix Composites (MMC) is a class of weight efficient structural materials that are becoming popular in engineering applications especially in electronic, aerospace, aircraft, packaging and various other industries. This study focuses on the development of carbon fiber reinforced copper matrix composite. Keeping in view the vast applications of metal matrix composites,this specific material is produced for its unique mechanical and thermal properties i.e. high thermal conductivity and low coefficient of thermal expansion at elevated temperatures. The carbon fibers were not pretreated but coated with copper by electroless plating in order to increase the wettability of carbon fiber with the copper matrix. Casting is chosen as the manufacturing route for the C-Cu composite. Four different compositions of the composite were developed by varying the amount of carbon fibers by 0.5, 1, 1.5 and 2 wt. % of the copper. The effect of varying carbon fiber content and sizes on the mechanical properties of the C-Cu composite is studied in this work. The tensile test was performed on the tensile specimens. The yield strength decreases with increasing fiber content while the ultimate tensile strength increases with increasing fiber content. Rockwell hardness test was also performed and the result followed the increasing trend for increasing carbon fibers and the hardness numbers are 30.2, 37.2, 39.9 and 42.5 for sample 1, 2, 3 and 4 respectively. The microstructures of the specimens were also examined under the optical microscope. Wear test and SEM also done for checking characteristic of C-Cu marix composite. Through casting may be a route for the production of the C-Cu matrix composite but still powder metallurgy is better to follow as the wettability of carbon fiber with matrix, in that case, would be better.

Keywords : copper based composites, mechanical properties, wear properties, microstructure
Conference Title : ICMMSE 2016 : International Conference on Metallurgy, Materials Science and Engineering
Conference Location : Venice, Italy
Conference Dates : August 08-09, 2016