Characterization of Cu/Alumina Metal Matrix Composites Prepared by Powder Metallurgy

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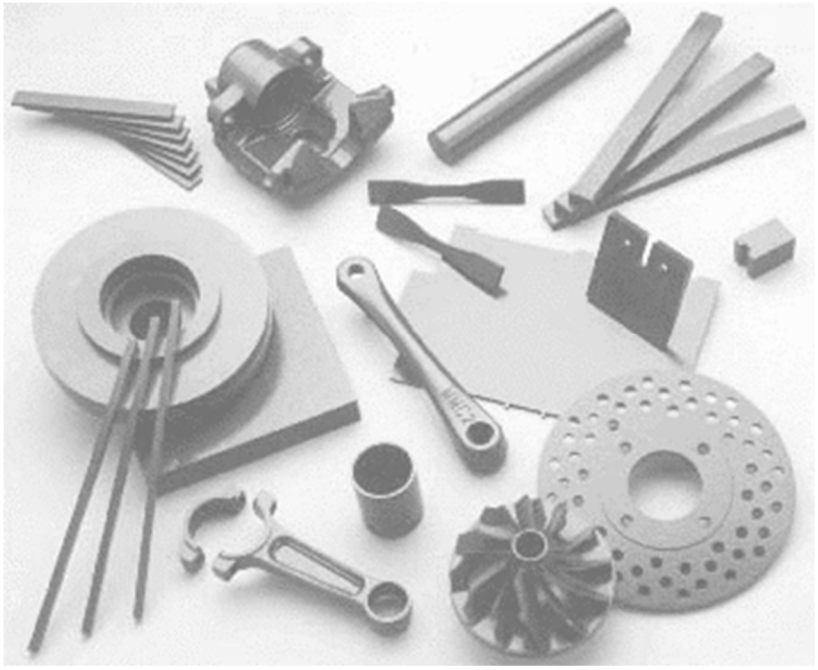
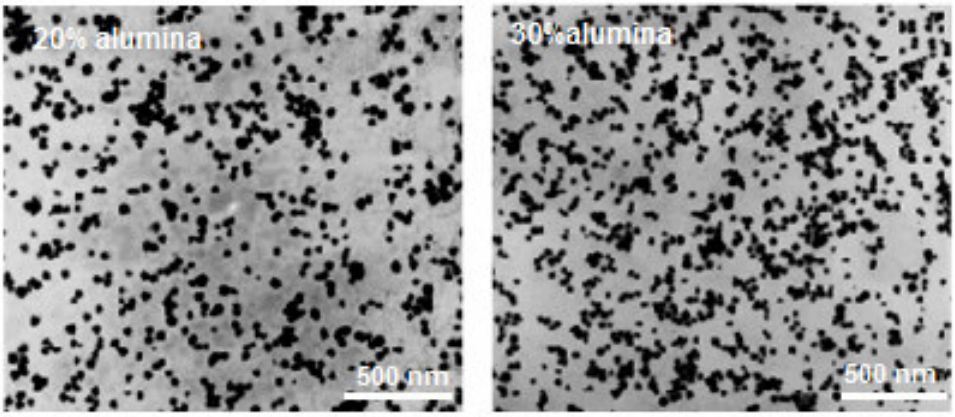
ABSTRACT

Metal matrix nanocomposites (MMNC) refer to materials consisting of a ductile metal or alloy matrix in which some nanosized reinforcement material is implanted. Copper has high thermal conductivity and used as a structural material for cooling. Copper matrix composites have a wide range of applications because of the combination of high mechanical strength and electrical/thermal conductivity. Copper Matrix Composite can be used in electrical switches and connecting pins due to its enhanced strength and electrical conductivity. The aim of the present work includes the strengthening of a copper alloy matrix by reinforcing with alumina nanoparticles. The Cu-alumina composites with volume fractions of 5% and 10% of alumina were prepared by a powder metallurgy process.



It is possible to obtain good quality Cu-alumina composites with the uniform distribution of reinforcement using hot pressing method. Sintering of the samples was done at 900^{o} C for 1 h in an argon atmosphere. The Vickers hardness test was carried out over different samples to show the comparison between pure Cu pellets and reinforcement added at different volume fractions before and after sintering. The SEM examination has revealed a homogeneous distribution of the alumina nanoparticles in the Cu matrix. Welding of alumina and cu particles was observed. The hardness of the Cu-alumina metal matrix composite increases with increase in vol. % of reinforcements in the composite.



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