

The thermal expansion behaviors of Cu-SiCp composites

Abstract

The demand for advanced thermal management materials such as silicon carbide reinforced copper matrix (Cu-SiCp) composites is increasing due to their high thermal conductivity and low CTE properties. However, the weak bonding between the copper matrix and the SiCp reinforcement degrades the thermophysical properties of the composites. In order to improve the bonding between the two constituents, the SiCp were copper coated (Cu-Coated) via electroless coating process. Based on the experimental results, the CTE values of the Cu-Coated Cu-SiCp composites were found significantly lower than those of the non-Coated Cu-SiCp composites. The CTEs of the Cu-Coated Cu-SiCp composites were in agreement with Kernel's model which accounts for both the shear and isostatic stresses developed in the component phases.

Keywords

Copper matrix composites; Electroless copper; Packaging materials; Porosity; Silicon carbide particles; Thermal expansion