

Compaction optimization of Sn-Cu-Si₃N₄ via powder metallurgy route for composite solder fabrication

Abstract

The aim of this study was to optimize the compaction process of a composite solder fabricated via powder metallurgy route, before details study were conducted in the next stage. Powder of Sn, Cu and Si₃N₄ were carefully weighted, mixed and blended in a mechanical alloying machine. Si₃N₄ were added to the Sn-0.7Cu solder as reinforcement. After 6 hours of mixing and blending, the powders were later compacted into a thin disc at 5 different pressures. Densities and volumes of the compacted samples were then obtained by using Micromeritics AccuPyc II 1340 Gas Pycnometer. All data were analyzed and compared with each other in order to select the best parameter for compaction pressure. Results showed that at 140 bars, the porosity percentage is the lowest. Hence, it was decided that 140 bars is the best parameter for compaction process.

Keywords

Composite; Lead-free solder; Powder metallurgy; Silicon nitride; Sn-0.7Cu