

Effects of Recycled-Aluminium additions on the mechanical properties of Sn-0.7Cu/Cu-Substrate lead-free solder joints

Abstract

Varying amount of recycled-Aluminium (0, 3.0, 3.5 and 4.0 wt.% re-Al) particulates produced from aluminium beverage cans were successfully reincorporated into Sn-0.7Cu base matrix solder material via powder metallurgy technique. This paper focuses on the mechanical properties aspect of the new solder when joint on Cu-substrate. The hardness of the composite solders sintered bulks was enhanced with the increasing re-Al additions. Moreover, the composite solders have shown enhancement of shear stress strength at the solder joints. Fracture surface of the failure samples were analyzed using scanning electron microscope (SEM) which have indicated all samples failed under ductile fracture mechanism. However, with the refining dimples formation shown on the fractograph, this report suggests the increasing re-Al reinforcement has optimized the solder joints ductility strength.

Keywords — Hardness, lead-free composite solder, recycled-Aluminium, shear stress.