

Influence of multi-walled carbon nanotubes on melting temperature and microstructural evolution of Pb-free Sn-5Sb/Cu solder joint

ABSTRACT

The effects of multi-walled carbon nanotubes on the melting temperature and microstructural evolution of the Sn-5Sb/Cu joints with solder formulations (Sn-5Sb-xCNT; 0, 0.01, 0.05 and 0.1 wt.%) was evaluated. The melting temperature results indicate that the presence of carbon nanotubes addition to the solder matrix lead to a marginal decrease in the peak temperature of the composite solders due to high surface free energy of MWCNTs in the solder matrix. More so, solder joints were subjected to both the as-reflow and isothermal aging conditions after which the microstructural evolution in the joints was investigated. From the IMC thickness data retrieved, it was observed that the composite solders showed better results for all subjected conditions as compared with the plain solder and the most appreciable IMC layer suppression was detected across board in the 0.05wt.% CNTs reinforced solder system.

Keyword: Lead-free solders; Carbon nanotubes; Composite solders; IMC thickness