C11-04-2

Interfacial and Surface Characterization of Fluorine Treated SnAgCu and NiTi Powders and NiTi/SnAgCu Composite Materials

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Abstract

NiTi shape memory alloy particles have been incorporated inside SnAgCu lead free solder paste in order to improve mechanical performances of solder paste.
However, because of the non-wetting properties of solid NiTi particles by liquid SnAgCu matrix, the development of fluorine gas treatment of both NiTi and SnAgCu particles has been optimized. Scanning electron microscopy (SEM) micrographs of NiTi/SnAgCu composite materials have shown that fluorine treatment of SnAgCu powders lead to an huge increase of the NiTi powder content inside liquid SnAgCu matrix where no effect have been observed when NiTi materials are fluorinated. X-ray photoelectron spectroscopy analysis of treated SnAgCu powders have been used in order to analyzed surface chemistry evolution where Auger electron spectroscopy and wavelength dispersion spectroscopy line profile across NiTi-SnAgCu interfaces have been performed. SEM and X-ray diffraction have been used to characterize the structural features of as prepared NiTi/SnAgCu composite materials.

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Thermal Properties of Sintered Cu-Al Powders

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Abstract

Today, there is a strong push to improve the thermal management of electronic devices in order to increase their performance and reliability. Up to now, heat sinks are mainly made of copper. However, to achieve unprecedented properties, combining different materials in the form of composites provide a solution; they need to be designed, developed and tested from microstructural and micro architectural perspectives.
Cu-Al system has been investigated both from experimental and modeling points of view.
Pure copper and aluminum powders have been mixed and hot pressed at 600 캜 and 50 MPa to be consolidated. Different isothermal heat treatments have also been realized in order to change the chemistry and the morphology of the system. Sintered samples have been characterized using XRD, SEM and EPMA analyses. These results have been explained and compared to the Al-Cu phase diagram. Conductivity of these samples have been measured and expressed as a function of the sintering time and microstructure.
Simulation of the thermal conductivity and thermal expansion have been performed that explicitly accounts the microstructural features of the two phases and compared to the experimental results. It is shown that the thermal properties are a strong function of size, shape and orientation of the two phases.