Influence of Bi addition on microstructure and thermal properties of SAC108 solders

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Solders are essential for creating strong, conductive joints in electronic circuits without damaging sensitive components. Sn-Pb eutectic solder alloy has been widely used in the electronics industry due to its suitable mechanical and thermal properties [1]. However, global restrictions on lead-containing solders, driven by environmental and health regulations, have necessitated the development of alternative soldering alloys [2]. Various lead-free solder alloys have been proposed, including Sn-Ag, Sn-Ag-Cu, Sn-Cu, Sn-Zn, and Sn-Bi systems. Among these, Sn-Bi based solder alloys have attracted considerable attention due to their lower melting temperatures, good tensile strength, and excellent creep resistance, making them promising candidates to replace traditional lead-based solders [3]. The aim of this work was to study the influence of Bi addition on the microstructure and thermal properties of SAC108 lead-free solders. In this investigation, scanning electron microscopy, energy-dispersive spectroscopy, and differential scanning calorimetry were used. The addition of Bi resulted in a lowering of the melting temperature. Microstructural changes were also observed, such as the formation of Bi globular particles at the boundaries between the matrix and minor intermetallic phases.

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