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The Effect of Ni and Bi Additions on the Solderability of Sn-0.7Cu Solder Coatings

Abstract

The present investigation explores the influence of Ni and Bi on the solderability of Sn-0.7Cu solder coatings. The minor addition of 0.05 wt.% Ni into the Sn-0.7Cu solder alloy results in an improvement in the wettability based on dipping tests. The solderability investigation using a globule mode shows the influence of Ni and Bi on the interfacial intermetallic compound (IMC). The addition of Ni to a Sn-0.7Cu solder coating resulted in a $(Cu,Ni)_6Sn_5$ interfacial IMC, which enhanced the solderability performance during the globule test. With an increasing amount of Bi in the Sn-0.7Cu-0.05Ni-xBi solder ball, the surface energy of the solder alloy can be reduced, and this improves the solderability. The synchrotron micro-XRF results indicate that Ni is found in a relatively high concentration in the interfacial layer. Additionally, Bi was found to be homogenously distributed in the bulk solder, which improved solderability.

Keywords

Free solder; Intermetallic compound; Solder coating; Solderability; soldering