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A comparative study of solder properties of Sn-0.7Cu lead-free solder fabricated via the powder metallurgy and casting methods

Abstract

The properties of Sn-0.7Cu solder bulk prepared via the powder metallurgy (PM) method were investigated and compared with solder bulk fabricated through casting. Distinct microstructures were observed in both PM and casting Sn-0.7Cu solder bulks. PM Sn-0.7Cu solder showed denser and finer Sn-grain structure, while cast Sn-0.7Cu showed larger Sn-rich dendrites with the presence of eutectic phase region. The mechanical performance of the solder bulk prepared with the PM technique was enhanced as it had higher microhardness value, UTS, and yield strength compared to the solder bulk prepared using the casting method. The solder wettability of the product was also increased using the PM method. Overall, the PM method can improve the mechanical and solderability properties of lead-free solder; therefore, it holds great potential as a new method for solder fabrication.

Keywords — Solder, intermetallics, powder metallurgy, mechanical, microstructure, wettability