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BASIC STUDY ON THIXO-FORMING OF THIN-WALLED ELECTRONIC PACKAGING SHELL WITH SEMI-SOLID ALUMINUM ALLOY

Abstract

Aiming at the disadvantages of long production line, high cost and bad compactness for the thin-walled electronic packaging shell production with traditional powder metallurgy method (SiC preformed billet infiltrate with melting metal), a new thixo-forming technology with SiC/semi-solid aluminum alloy is proposed. The unique thixotropic characteristic of semi-solid aluminum slurry can achieve near net forming for the thin-walled complex cavities of electronic packaging shells. Then, the special spherical grain can further enhance the specific stiffness and specific strength compared with traditional liquid forming method, which can further reduce the structure weight. Finally, a proper volume fraction of composite SiC particles can further reduce the coefficient of thermal expansion. Therefore, the precision thixo-forming of thin-walled electronic packaging shell with lower density and thermal expansion rate can be realized. This paper primarily investigated the influences of thixo-forming parameters on the microstructures of semi-solid aluminum alloy, which is the key factor for the thixo-forming of thin-walled electronic packaging shell. Results show that the average particle size (APS) and shape factor (SF) were increased with the increasing re-melting temperature. The APS was decreased, whereas the SF was increased with the increase in squeeze pressure. The APS was increased with the mould preheated temperature, whereas the SF increased initially and then decreased when preheated temperature exceeded 573K. Finally, the optimal process parameters for thixo-forming of electronic packaging shell were obtained.