Prediction of mechanical properties and fatigue life of nano silver paste in chip interconnection

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Abstract

The simulation of nano-silver solder joints in flip-chips is performed by the finite element software ANSYS, and the stress-strain distribution results of the solder joints are displayed. In this simulation, the solder joints use Anand viscoplastic constitutive model, which can reasonably simulate the stress and strain of solder joints under thermal cycling load. At the same time this model has been embedded in ANSYS software, so it is more convenient to use. The final simulation results show that the areas where the maximum stresses and strains occur at the solder joints are mostly distributed in the contact areas between the solder joints and the copper pillars and at the solder joints. During the entire thermal cycling load process, the area where the maximum change in stress and strain occurs is always at the solder joint, and when the temperature changes, the temperature at the solder joint changes significantly. Based on comprehensive analysis, the relevant empirical correction calculation equation is used to calculate and predict the thermal fatigue life of nano-silver solder joints. The analysis results provide a reference for the application of nano-silver solder in the electronic packaging industry.

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