Studies for ENIG surface behavior of FCBGA through the time by using water dip test method

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Abstract : ENIG(Electroless Nickel Immersion Gold)is a surface treatment method that is used most widely at fine pitch's SMT and BGA packaging process. ENIG has good diffusion barrier of Ni against solder and good wettability due to Au finish. But when the discoloration occurred on the Au finish of ENIG, some key characteristics related to the quality and reliability of PCB such as bondability, solderability and electrical flowing of packaging process could be deteriorated.

In this paper, we have performed the water dip test (88℃ purified water) which accelerates the galvanic corrosion of Ni diffused from the Ni-P layer. That is, the excessive oxidation of the Ni layer could result in non-wetting of the solder because the flux may not be able to remove excessive oxides. Though Au discoloration have been reported to be caused by Ni oxides in many literature, it is still open to verify and discuss

The microstructures and chemical compositions have been investigated using FE-SEM, TEM, FIB, EDS and XPS. As a result, authors have found that the Au discoloration in ENIG type is severely caused by the oxidation of the Ni and the mechanism of Au discoloration can be confirmed through the experiment result of water dip test

Key Words : ENIG, Water dip test, Galvanic corrosion, Au discoloration, Ni oxides