

Introduction of Copper Alloy Bonding Wire for the High Rel Industry

Speaker: William Crockett Jr. – Tanaka, Japan

E-Mail: w-crockett@ml.tanaka.co.jp

Abstract

Since around 2008, the shift from Gold (Au) bonding wire to Copper (Cu) bonding wire has been taking place on full scale with the aim of reducing costs. When compared with Au, Cu wire presents challenges in reliability and repeatable bonding characteristics in terms of chemical stability, which is required in high reliability applications. Therefore Cu wire adoption in automotive and industrial semiconductors has been limited. Conventionally, the market of Cu bonding wires has been divided into two types: bare Cu wires (high purity) and palladium coated (PCC) bonding wires. These wires have yet to satisfy the required characteristics for high reliability products such as industrial and automotive electronics.

A new bare Cu alloy wire offers competitive advantages for high reliability applications with reliability improvements of 1.5 times conventional bare copper wire. As a result of testing the failure rate at the high temperature of 175 degrees Celsius, it was found that the failure rate of conventional bare copper wire started rising after 800 hours, Cu alloy wire maintained a failure rate of 0% even after 1,200 hours, confirming that it has 1.5 times the reliability of conventional bare Cu wire. With the reliability 1.5 times than conventional bare Cu products, Cu alloy wire excels in all aspects of productivity, bondability, cost and electrical conductivity. In addition, Cu alloy wire can achieve higher productivity on 2nd bond process and no damage to aluminum electrodes on IC chips due to the optimization of ball softness

Cu alloy wire is able to significantly reduce manufacturing costs while sufficiently meeting the required performance by replacing the currently widely used gold wire in applications requiring high reliability, such as automotive electronics, industrial electronics and military high reliability applications. Costs can be further reduced by 20% when compared to PCC wires.

Will Cu alloy wire gain acceptance in the high reliability electronics? Stay tuned...