PO2077

Batch Microwave Plasma Cleaning for Robustification of Automotive Devices

Ghizelle Abarro[1], Rod Delos Santos, Jr.[1], Ariel Tan[2], Alvin Denoyo[1], Manny Ramos[1]

[1]ON Semiconductor Philippines Inc., Carmona, Cavite, Philippines [2]ON Semiconductor Philippines Inc, Carmona, Cavite, Philippines

Ghizelle.Abarro@onsemi.com

Considering the function requirements in the automotive industry, a more robust electronic system is required to ensure both safety and user satisfaction. The most common defect encountered in the IC packaging industry is interfacial delamination – caused either by material mismatch during thermal expansion or by surface contamination. The latter can be easily addressed with plasma cleaning techniques. This study attempts to explore the use of batch microwave (B-MW) plasma cleaning to address delamination on NiPdAu lead frames in the IC manufacturing industry. Conventional plasma cleaning machines have a strip-type set-up which involves direct application of plasma onto lead frame strips. However, the direct flow of plasma has been observed to damage die and wire parts. The batch-type set-up is becoming increasingly popular due to its indirect application of plasma and higher throughput. Plasma cleaning mechanisms involve a combination of physical and chemical reactions; although, parameters can be adjusted to make either type more dominant. Physical reactions are typically more dominant in RF while chemical reactions are more dominant in MW.
Six factors were initially identified to directly affect the efficiency of B-MW plasma cleaning: power, cleaning time, flow type, gas mix, ratio of reactive-to-inert gas and staging time. Among these six factors, the flow type has the most profound effect on the cleaning efficiency – even affecting the role of the other five factors. Flow type is categorized into two: (1) pulsed and (2) constant flow. With the use of constant flow, the average contact angle is also reduced by 50% and uniformity improves.

Keywords
batch
microwave
IC packaging
automotive
electronics