

Plasma Cleaning of LED Lighting Package

SAMCO provides a “One Stop Solution” – a turn-key solution for LED manufacturing such as deposition, etching, and cleaning. Here is an introduction to plasma cleaning technology used for LED lighting packages.

Benefits of Plasma Cleaning

Fig.1 and Fig.2 show the typical structure of LED chip and LED packaging, respectively. Plasma cleaning can improve the strength of wire-bonding between the electrodes on the chip and wires from the packaging and also improves the adhesion between the housing and encapsulating resin.

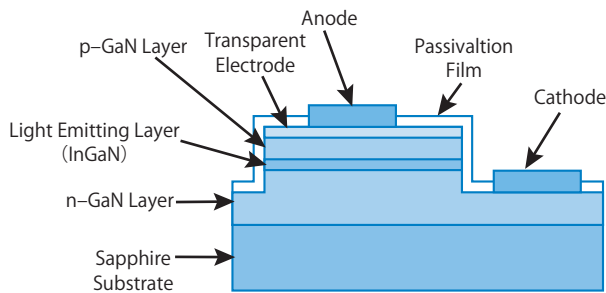


Fig. 1 Typical GaN LED Structure

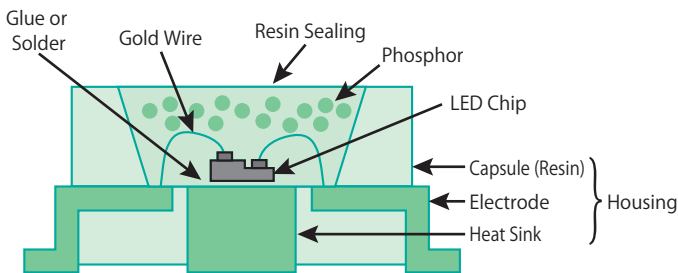


Fig. 2. Typical White LED Package
Reference: Japan LED Association

Argon Plasma

Ar sputtering is mainly used in LED cleaning processes to remove organic contamination and raise surface energy by adding functional groups. However, the silver electrode of the package often causes problems as it is easily sputtered and contaminates the passivation film (SiO_2), which results in lower light brightness.

In this note, SAMCO is reporting about a study made on alternative cleaning processes for LED packaging.

H_2/O_2 Plasma

An oxygen plasma can clean organic contamination without sputtering, but it oxidizes and turns the silver surface black. However, by adding H_2 , the oxidization of silver can be prevented.

Fig.3 shows the result of ESCA analysis, which shows that a H_2/O_2 plasma cleans as well as an Ar plasma.

Fig.4 shows the amount of silver transferred onto the passivation film of the LED chip. It is clear that no silver is observed on the SiO_2 passivation film.

These results show that H_2/O_2 plasma can provide an effective cleaning process without sputtering of silver onto the passivation film.

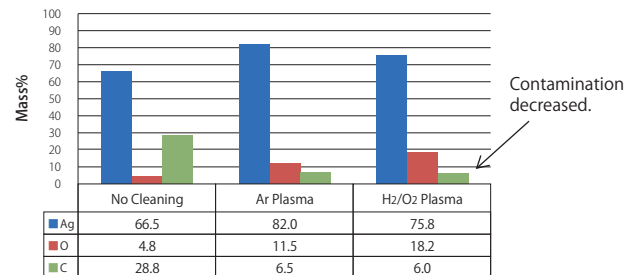


Fig. 3 ESCA Analysis of Silver Electrode

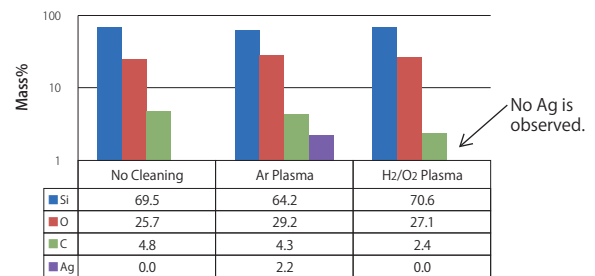


Fig. 4 ESCA Analysis of SiO_2 Film

SAMCO PC-300

The SAMCO model PC-300, plasma cleaner, which was used for the evaluation has a very small footprint. It has reversible electrode shelves 320mm(W) x 230mm(D), which allows changing of the plasma mode.



Plasma Cleaner
Model : PC-300