Study the Application of Surface Planarization Process in GaN LEDs

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ABSTRACT

In recent years, much of the basis for epitaxial growth and the understanding of the fundamental materials properties were established to make LED that can drive at high current and hence resulted in higher light output. The junction temperature of the LED chip will increase when it is driven at higher current. The increase of junction temperature will affect many LED parameters such as light output, wavelength , lifetime and forward voltage so that is very important to decrease the junction temperature for better performance of LED.

In this dissertation, we apply the semiconductor surface planarization process on LED. First, a metallic column is deposited onto the n-type electrode and p-type electrode respectively, followed by coating the BCB for LED passivation to encapsulate LED to protective LED to form a Flip-Chip LED, Finally deposited a large area metallic pad on the metallic column and the structure can dispersion the MQW heat quickly and decrease junction temperature and expectation the process can replace the tradition led package.

When LED is supplied with 350mA, The junction temperature of the led that in the dissertation can lower than Flip-Chip LED in epoxy encapsulated in 12.5℃. Moreover, The junction temperature of the LED that in the dissertation can decrease 4.4℃ after we deposited large area metallic pad on the metallic column. BCB transmittance can reach 95.7% on blank glass and transmittance can reach 90.9% on led chip in my dissertation.

Keywords : surface planarization、BCB、junction temperature

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