

## **ZOGAN LED: Breakthrough for microLED displays**

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**Abstract:** A new type of light emitting device, ZOGAN LED, will be introduced in the seminar. ZOGAN LEDs and GaN LEDs are identical to each other in device epi structure except the p-layer; the p-layer for ZOGAN LEDs comprises both p-ZnO and p-GaN, while only p-GaN for GaN LEDs. However, ZOGAN LEDs are dramatically different from GaN LEDs in device characteristics and performance. For example, it is well known for GaN LEDs that the EQE becomes worse, as the device size becomes smaller, the In-concentration of the active layer is higher, or the injection current is larger. However, ZOGAN LEDs do not show such EQE Droops, keeping the peak EQE constant in a range of >50% certificated.

We have proved with the ZOGAN LED that the strange behaviors of GaN-based light emitting devices such as the so-called EQE droop, Green Gap and chip size-dependent EQE decrease are not caused by either the strain related to lattice mismatch or surface defects at all, and further that these behaviors are not the inherent features of the GaN light emitting devices. Since the most-accepted theories, ever proposed to explain these characteristics of GaN LEDs, are inconsistent with what we have observed in GaN and ZOGAN LEDs, we have proposed a new theory, called R2SB. The R2SB theory explains very well what makes these weird characteristics of the GaN LED.

In this presentation, we will further report how well the outstanding device performances of ZOGAN LEDs are regardless of the chip size or the emission wavelength. The ZOGAN microLED completely satisfies the requirements for the ultra-high resolution microLED displays.