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Abstract
In this research, we study the influence of the electrode pattern design on turn-on voltage、light intensity、junction working temperature and current distribution in light emitting diodes (LEDs). We also study the influence of temperature on electroluminescent dominate wavelength for light emitting diodes. Furthermore，we utitizing Photo emission Microscope inspection to failure analysis for failure devices. We hope of advances notions between electrode pattern design and turn-on voltage、light intensity、temperature for LEDs. We designed several electrode patterns in the fixed sized LEDs. In our research, we found that the reduction of turn-on voltage is related to the increasing total length of P-electrode and N-electrode. Furthermore, we found that the reduction of turn-on voltage is also related to the parallel length of P electrode and N electrode. Base on the experiment results, we estimated the reduction of turn-on voltage is proportion to the total length of P electrode and N electrode. For conversation efficiency, we found it proportion to the area which deduct P electrode area from transparent conduction layer (TCL) and the area of P electrode overlap N electrode. But, based on experiment results of temperature, we found that the LEDs of electrode pattern design unconformable would accounted for current crowding effect

caused electroluminuence dominate wavelength shift acutely and light intensity saturation early. Based on failure analysis results, we found that when applied reverse bias, the LEDs of high leakage current would found failure point easily in photo emission microscopy measurement. We think that make up to failure analysis more intimate for failure point at failured devices.
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