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器件制备及器件物理

不同形状的电流阻挡层对GaN基LED光效的影响

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摘要： 电流阻挡层(CBL)可以改善发光二极管(LED)的发光效率和输出光功率, 其形状对电流的阻挡作用有影响。本文通过等离子体增强化学气相沉积设备(PECVD)在InGaN/GaN多量子阱外延片上制备了SiO₂薄膜, 并腐蚀出不同结构作为电流阻挡层; A组形状与P电极形状相同, B组为Y形CBL, C组为点状CBL。通过对这3组芯片与常规芯片的对比, 发现加入CBL对小功率LED的电压特性影响比较小, 并且电流阻挡层形状与金属电极形状相同时对光效的提高最大, 可以提高14.6%。

关键词： 发光二极管(LED) 电流阻挡层(CBL) 光效

Improving Luminous Efficacy of The GaN-based Light-emitting Diodes by Using Different Shapes of Current Blocking Layer

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Abstract: Current blocking layer (CBL) was used to improve light output power and luminous efficacy of the LEDs. The structure of CBL can block the current from entering the active region below the top contact. The shape of current blocking layer impacts properties of LEDs, so we fabricate different kinds of SiO₂ CBL by plasma enhanced chemical vapor deposition (PECVD) and etched. There are 3 shapes in the experiment: Group A has a whole structure of CBL which approximately has a same shape of top metal contact layer, group B is a Y-shaped which located on top of the upper confinement, and group C only has a point-shaped structure under the metal pad electrode. According to the experiment, we obtain that the difference of voltage between different groups is not too large in low power LEDs, when CBL and P-electrode have the same shape, the LED has the best properties and by 14.6% compared to that of conventional LEDs.

Keywords: light-emitting diodes(LEDs) current blocking layer(CBL) luminous efficacy

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