



器件制备及器件物理

基于表面等离子激元的双金属光栅结构提高LED光提取效率的研究

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摘要：为了提高GaN基LED的光提取效率，构建了一种在金属银膜上下表面分别刻蚀光栅结构的双光栅LED模型。利用时域有限差分法（FDTD）进行数值模拟，比较了无银膜、无光栅、单光栅、双光栅模型下LED的光提取效率。结果表明：在光栅周期为300 nm，占空比为0.23，银膜厚度为30 nm，光源深度为150 nm时，光提取效率较单光栅结构提高了6倍，较无光栅结构提高了16倍。

关键词：发光二极管 时域有限差分法 光提取效率 表面等离子激元

Improvement of LED Light Emitting Efficiency by Using Double Metal Gratings

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Abstract: In order to improve the light emitting efficiency of GaN-based LED, a double-grating structure was established by etching grating on both sides of silver metal film. A numerical simulation was conducted using the finite difference time domain method (FDTD). The light extraction efficiency in different patterns was compared, including without-silver-film pattern, without-grating pattern, single-grating pattern and double-grating pattern. When the grating period is 300 nm, duty cycle is 0.23, silver film thickness is 30 nm and light source depth is 150 nm, the light extraction efficiency of the double-grating structure is improved by 6 times than the single-grating structure, and 16 times than the structure without grating.

Keywords: light emitting diodes finite-difference time-domain light extraction efficiency surface plasmon polaritons

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