



Nitride Based Ultraviolet LED with an Ultraviolet Transparent Contact

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BACKGROUND

In conventional UVLED nitride devices, a metal mirror is often used as an electrical contact and requires the incorporation of other metals in order to obtain a low resistance electrical contact with the semiconductor material. These additional metals, however, are not transparent to emitted photons which causes a significant decrease in device efficiency. Although dielectric mirrors provide a potential alternative, their poor electrical properties are not suitable for high efficiency devices.

DESCRIPTION

Researchers at the University of California, Santa Barbara have developed a nitride based UVLED with an ultraviolet transparent contact (UVTC) that is an alloy composition of (Ga, Al, In, B)O semiconductors, such as Ga₂O₃. The n-type, p-type and UVTC regions are all transparent to UV light and minimize internal reflections within the UVLED by eliminating mirrors and/or mirrored surfaces. As a result, the UVLED output is drastically increased via the minimization of light re-absorption. Therefore, the improved light emission efficiency of UVLEDs enables the expansion of ultraviolet semiconductor device applications into a variety of commercial products.

ADVANTAGES

- ▶ Increased light efficiency
- ▶ Expands UVLED applications

APPLICATIONS

- ▶ UVLEDs
- ▶ LEDs
- ▶ Micro-LEDs

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20230420617	12/28/2023	2021-567

CONTACT

Pasquale S. Ferrari
ferrari@tia.ucsb.edu
tel: .

INVENTORS

- ▶ [DenBaars, Steven P.](#)
- ▶ [Iza, Michael](#)
- ▶ [Nakamura, Shuji](#)
- ▶ [Wong, Matthew S.](#)

OTHER INFORMATION

KEYWORDS

UVLED, LED, micro-LED,
UVTC, transparent, ultraviolet
transparent contact

CATEGORIZED AS

- ▶ [Energy](#)
- ▶ [Lighting](#)
- ▶ [Semiconductors](#)
- ▶ [Design and Fabrication](#)

RELATED CASES

2021-567-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ Vertical Cavity Surface-Emitting Lasers with Continuous Wave Operation
- ▶ Eliminating Misfit Dislocations with In-Situ Compliant Substrate Formation
- ▶ III-Nitride-Based Vertical Cavity Surface Emitting Laser (VCSEL) with a Dielectric P-Side Lens
- ▶ Enhanced Light Extraction LED with a Tunnel Junction Contact Wafer Bonded to a Conductive Oxide
- ▶ Methods to Produce and Recycle Substates for III-Nitride Materials with Electrochemical Etching
- ▶ III-Nitride Tunnel Junction with Modified Interface
- ▶ Improved Reliability & Enhanced Performance of III-Nitride Tunnel Junction Optoelectronic Devices
- ▶ (In,Ga,Al)N Optoelectronic Devices with Thicker Active Layers for Improved Performance
- ▶ Thermally Stable, Laser-Driven White Lighting Device
- ▶ III-Nitride Tunnel Junction LED with High Wall Plug Efficiency
- ▶ Novel Multilayer Structure for High-Efficiency UV and Far-UV Light-Emitting Devices
- ▶ A Method To Lift-Off Nitride Materials With Electrochemical Etch
- ▶ Activation of P-Type Layers of Tunnel Junctions in Micro-LEDs
- ▶ High-Intensity Solid State White Laser Diode
- ▶ Epitaxial Light Control Features in Light Emitting Diodes
- ▶ High-Efficiency Vertical Cavity Surface Emitting Laser Fabrication
- ▶ A Wafer-Scale, Low Defect Density Strain Relaxed Template for III-Nitride-Based High Efficiency and High-Power Devices
- ▶ High-Efficiency and High-Power III-Nitride Devices Grown on or Above a Strain Relaxed Template
- ▶ III-Nitride Based VCSEL with Curved Mirror on P-Side of the Aperture

