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# Nitride Based Ultraviolet LED with an Ultraviolet Transparent Contact

Tech ID: 32271 / UC Case 2021-567-0

### **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 Ga<sub>2</sub>O<sub>3</sub>. The ntype, 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	Туре	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

- ▶ 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
- ▶ 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
- ► High-Intensity Solid State White Laser Diode
- ▶ 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

University of California, Santa Barbara
Office of Technology & Industry Alliances
342 Lagoon Road, ,Santa Barbara,CA 93106-2055 |
https://www.tia.ucsb.edu
Tel: 805-893-2073 | Fax: 805.893.5236 | padilla@tia.ucsb.edu



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