Enhanced Light Extraction LED with a Tunnel Junction Contact Wafer Bonded to a Conductive Oxide

Tech ID: 25741 / UC Case 2016-324-0

BACKGROUND

The development of light emitting devices (LEDs) with optimized materials is essential to increase the overall efficiency of the myriad commercial applications of the LED. Wafer bonding permits extension of the design parameters of these devices by allowing the formation of heterojunctions that are not possible through conventional deposition schemes. Bonding to transparent conductive materials leads to higher efficiency due to enhanced light extraction.

DESCRIPTION

Researchers at the University of California, Santa Barbara have developed a method for bonding transparent conductive oxides on III-nitride materials using wafer bonding techniques. Light emitting devices (LEDs) can be processed using this technique which yields higher efficiency devices than traditional methods and allows for greater design options for fabricating devices such as fully transparent tunnel junction-based III-nitride-based LEDs.

ADVANTAGES

- Increased light extraction efficiency
- Greater design options for fabricating devices

APPLICATIONS

- Fully transparent tunnel junction-based LEDs
- LEDs

PATENT STATUS

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Patent Pending

CATEGORIZED AS

- Energy
- Lighting
- Other
- Engineering
- Engineering
- Semiconductors
- Design and Fabrication

RELATED CASES

- 2016-324-0

RELATED TECHNOLOGIES

- Contact Architectures for Tunnel Junction Devices
- III-Nitride Tunnel Junction LED with High Wall Plug Efficiency
- Methods for Fabricating III-Nitride Tunnel Junction Devices
- III-Nitride Tunnel Junction with Modified Interface
- Hybrid Growth Method for Improved III-Nitride Tunnel Junction Devices

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Method for Improved Surface of (Ga,Al,In,B)N Films on Nonpolar or Semipolar Substrates
- High Efficiency LED with Optimized Photonic Crystal Extractor
- Enhanced Optical Polarization of Nitride LEDs by Increased Indium Incorporation
- Etching Technique for the Fabrication of Thin (Al, In, Ga)N Layers
- Lateral Growth Method for Defect Reduction of Semipolar Nitride Films
- Vertical Cavity Surface-Emitting Lasers with Continuous Wave Operation
- Low-Cost Zinc Oxide for High-Power-Output, GaN-Based LEDs (UC Case 2010-183)
Defect Reduction of Non-Polar and Semi-Polar III-Nitrides

Low-Cost Zinc Oxide for High-Power-Output, GaN-Based LEDs (UC Case 2010-150)

Suppression of Defect Formation and Increase in Critical Thickness by Silicon Doping

Wafer Bonding for Embedding Active Regions with Relaxed Nanofeatures

Enhancing Growth of Semipolar (Al,In,Ga,B)N Films via MOCVD